ELECTRICAL REVIEW

[ILLUSTRATED.]

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The Union Fire Alarm System.

We illustrate herewith the new and complete system of fire alarm just brought out by the Union Fire Alarm Company, of this city, which our readers will find worth while looking into.

The chief claims of the inventor of this system, Jos. T. Murray, are that it is far cheaper than any other system now on the market, as it is simple in construction and has less parts and no complicated machinery to get out of order.

It can be used either as an open or closed circuit, as desired. The same system can be used as a messenger call. In the boxes of this company provision is also made for the reception of ambulance and police calls. The company furnish private boxes when desired. Mr. L. K. McKinney, president of the company, has headquarters at 145 Broadway.

The Bright Platinum Plating Process.

Since the industrial application of Messrs. Elkington's discoveries relating to the electro-deposition of metals—gold, silver, copper, etc.—led to such great success, many attempts have been made with the view of applying a similar process to the electro-deposition or coating of baser metals with platinum.

It has been known for many years that platinum, while considerably less in market value than gold, has an equal, if not greater, power of resistance to exterior influences. Its surface once bright can never be touched or tarnished by any simple acid; and to all practical intents and purposes, the metal, being much more dense and harder than gold, will resist a far greater measure of wear and tear than its more precious congener.

Hence it long since became apparent to those interested in the maintenance of bright metallic surfaces that the successful electro-deposition of platinum would be a most valuable acquisition to our industrial resources.

Many attempts to produce this end followed, but until lately they proved more or less abortive. It was found that, although platinum was quite capable of being deposited electrolytically, the process was uncertain in its action, the deposited metal being black, pulverulent and non-adhesive to the surface upon which it was deposited. The three chief desirable objects of success were thus unobtained.

It is, therefore, satisfactory to note that, during the last few months, a method has been discovered by an ingenious English inventor, by means of which platinum can, in the first place, be deposited upon any surface capable of receiving electro-depositions of other metals; in the second, that it can be thus deposited in a perfectly dense metallic or reguline condition, having a luster equal to that of silver plate, and at the same time adhering firmly to the material upon which it is deposited.

The patent rights for Great Britain and foreign countries covering the above invention, have been acquired by the "Bright Platinum Plating Company, Limited," whose works are installed in London, and fairly started in a good way of business.

The great industrial importance of this invention cannot be over-rated; its applications are innumerable.

Silver blackens and tarnishes upon the slightest exposure to an atmosphere or liquid containing compounds of sulphur. Platinum retains its perfect luster under all such circumstances. Brass soon becomes discolored and covered with verdigris; so also does bright copper, while steel, especially that used in the manufacture of the finer class of goods, rusts until the beauty or utility of the article is gone. Platinum never becomes discolored, neither does it rust.

In the manufacture of acids, and in the

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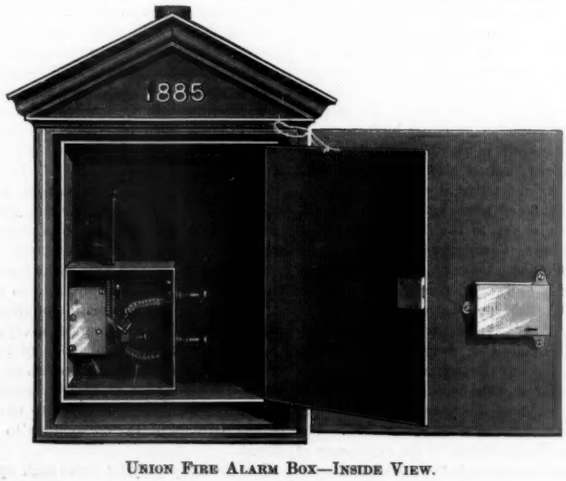
preparation of various articles of domestic consumption, the use of solid platinum, drawn or wrought, has been rendered necessary on account of the solvent action these acid liquors have upon other metals. The coat of platinum deposited by the process above alluded to, is, however, of such a dense form, and so perfectly reguline, that a copper or iron vessel thus plated may replace that of solid platinum at one hundredth part of the cost.

As a proof of this, it may be stated that German silver spoons, which before plating with platinum would have dissolved like sugar in boiling nitric acid, have after submission to the coating operation, been boiled in the same acid for hours at a time, without being acted upon in the slightest degree.

It is evident that in the process cited above, something is indicated which ought to arrest the attention of intelligent manufacturers.

UNION FIRE ALARM BOX INDICATOR.



UNION FIRE ALARM BOX—INSIDE VIEW.

The Present State of Electric Lighting.

The *Mail and Express* says that the Electric Light Convention that has just closed its sessions in Detroit, not only showed what an important illuminator electricity has come to be in this country, but also what a variety of interests and industries are bound up in the general business of electric lighting. If specialization is a sign of progress in any industry—as it must be, according to the evolution theory—electric lighting must have made tremendous strides in the few years of its existence. And it has. It is past the first period of speculative existence, and has settled down into a conservative business on pretty well established principles.

If the electric light had done nothing more than to stir up the gas companies, and frighten them into providing better light for less money, it would have been of immense benefit to the public. Since it became evident that there was a serious probability that electricity would become a competitor of gas, more attention has been paid to the improvement and cheapening of processes of gas manufacture, and to economizing in its use. In almost every place where the electric light has been introduced at all, the gas service has been cheapened and bettered; and even the rumor of a possible establishment of an electric plant has often sufficed to bring down the gas companies.

All this, however, is what may be called the negative result accomplished by the application of electricity to illumination. Its positive results have been far more important and beneficial. Local companies are organizing in all directions; manufacturers have their facilities taxed to the utmost to keep up with the demands of their business; in many places even the gas companies, with wise foresight, have taken the bull by the horns, as it were, and themselves established plants for electric lighting.

In the early days of the new industry, there was necessarily a good deal of speculation about it; but now there are a dozen systems of lighting that have demonstrated their practicability and usefulness; and it is a business enterprise on the same footing as any other—with no greater uncertainties and no greater prospective profits—to organize a company for this purpose.

Constant improvements are making in the details of manufacture and construction of machinery and other "plant" for electric lighting; and these improvements are for the most part available for the use of the trade.

We may expect, therefore, to see constant advances made in the efficiency of the machinery, and constant reductions made in the expense. It is as certain as anything future can be that American cities, and, eventually, all civilized cities, will be well and cheaply lighted.

—— Sandusky, O., was without telephone service one day last week. Lightning melted the 450 wires of the switchboard and set fire to the tower of the telephone exchange. Three girls climbed to the roof and put out the fire. The explosion in the room of the exchange at the time the lightning struck sounded like a cannon.

Electric Smelting.

DR. R. H. THURSTON'S DESCRIPTION OF THE LARGEST DYNAMO IN THE WORLD.

The following paper was read by Dr. Robert H. Thurston, director of Sibley College. Cornell University, at the Buffalo meeting of the American Association for the Advancement of Science, August 19, 1886:

The process of reduction of aluminum and other metals, and production of alloys, invented by Messrs. Eugene H. and Alfred H. Cowles, and perfected with the assistance of Professor Mabery, of Cleveland, O., has attracted the attention of engineers, as well as of men of science, not only on account of the ingenuity, simplicity and effectiveness of the process itself, but also, and probably quite as much, because of its bringing into use the voltaic arc and dynamo-electric machines of exceptional and enormous power.

The writer, on the occasion of a recent trip to the West, was, on his return journey, so fortunate as to be able to stop in Cleveland long enough to witness the operation of the process, and to be present at the first trial of the great dynamo recently completed by the Brush Electric Company for the Cowles Electric Smelting and Aluminum Company. The occasion was so interesting, and the facts developed so striking and probably important, that it has been thought worth while to present a very brief account of them to the members of this section of the American Association for Advancement of Science.

The Cowles process, as will be remembered by those who listened to the interesting account given the association at the Ann Arbor meeting of 1885, and published in the *American Journal of Science* for October, consists in the passage of a powerful current of electricity from a "dynamo" through a mass of ore mixed with carbon and other material forming the "charge," until the action of the heat, and possibly of the electrical force, causes a reduction of the ores and the formation of an alloy of the metals so reduced. The apparatus consists simply of a powerful dynamo-electrical machine, connected with a pair of carbon electrodes of correspondingly exceptional size, these electrodes being enclosed in a furnace of brickwork, lined with the most refractory available material. The Cowles Company have several dynamos, all of large size; but it is the intention of the writer to describe but one—the latest built and the largest. The next smaller, which was until recently considered a very powerful machine, weighs about two tons and a half, is driven at 900 revolutions per minute, produces a current of 1,575 amperes, with an E.M.F. of 45 volts. These machines are "shunt-wound," and very nicely proportioned under the direction of the inventor, Mr. Charles F. Brush, whose interest in the work induced him to give to this construction his personal attention. The largest machine, recently completed, and under test at the time of the visit of the writer to the works, weighs 21,900 pounds (9,934 kgs), a so-called 424-inch (1060.8 mm.) machine, the armature having that diameter. The armature contains 1,600 pounds (7,257 kgs. of iron); it carries 825 pounds (378 kgs.) of copper wire, while the field magnets are wound with about six times that weight, 5,424 pounds (2641.8 kegs).

The armature of this great dynamo consists of sixteen bobbins, each carrying twenty-one turns of best copper wire, two strands lying side by side, the wire being 0.35 inch in diameter (8.89 mm). These sixteen bobbins are operated in multiple arc, thus giving thirty-two strands of copper wire of the diameter above stated, and about sixty-five feet (19.8 m.) long. Sixteen copper bars carry the current from the bobbins to the commutator, each bar being one inch by one-half inch (25.4 mm. by 12.7 mm.) in section. The two commutators are coupled in multiple arc.

The field magnets are eight in number, and consist of a cylindrical cast iron core, eleven inches (279 4 mm.) in diameter, by sixteen inches (406.4 mm) in length, and wound with thirty layers of one hundred and two turns, each of copper wire, 0.134 inch (3.404 mm.) in diameter; all the eight wires are coupled in multiple arc as in a shuntfield. Thus combined they have a resistance of about one ohm, total, cold. The pole pieces are of peculiar form, and fitted carefully to the field.

The driving shaft carrying the armature is 13 feet (3.962 m) long, and 5½ inches (139.7 mm.) in diameter in the main bearing; it is made of open hearth steel, furnished by the Otis Company. The machine is driven by means of a 44-inch (1.117.6 mm.) double belt, turning a 40-inch (1.016 mm.) pulley on the armature shaft. The machine occupies a space on the floor about 15 feet (4.572 m.) long, and 4 feet (1.219 m.) wide, and stands about 5 feet (1.52 m.) high.

This dynamo was calculated to furnish a current of 3,200 amperes, with an electromotive force of 80 volts, with a normal maximum current in the field of 80 amperes; the speed of rotation not to exceed 600 revolutions per minute. Its actual speed was a little above 400, when doing the full amount of work demanded. The maximum field is thus obtained with but about 2½ per cent. of the normal current (3,200 amperes) and falling to 1 per cent. when less E.M.F. is needed When in operation the writer found no observable heating in any part of the machine, and the bearings ran perfectly free from heating or cutting. The efficiency of the machine must be very great, as, after its longest run of two hours, the armature was cool enough to handle with perfect comfort. The writer could bear his hand on every accessible part of the machine, which included all parts liable to any serious heating. The belt was new and stiff, and occasionally slipped as the limit of the power of the machine was approached; but that was a fault which a little work would cure, by making the belt flexible and giving it a better bearing on its pulleys. Had the engine driving it been of sufficient power, it was evident much more work could have been done than was actually performed on the trial. It was judged that it might have been driven up to 300,000 Watts with safety. The conductors provided, and the resistance coil used in measuring the power developed, were, however, about at the limit of their endurance, as it was, the former heating until they were blue, and the latter requiring constant watching and cooling by application of water. The maximum reached was 249,000 watts, or 334 electrical horse-power, the engine probably developing not far from 400 indicated horse-power. No indicators had been fitted, and it was impossible to measure this factor. The limit of its power was reached, however, and the power of the dynamo could not be tested to its maximum. The speed intended was, for the dynamo, 430 revolutions, but at 80 volts it could not be driven by the engine up to that speed.

The dynamo was built, complete, in all its details, from the specifications of Mr. Brush, and without preliminary experiment, and, when tested, was found to require no alterations of any kind, and came fully up to the requirements of the specifications and contract. Its capacity is very much greater than that of any machine yet built in the United States, or in the world. Its successful construction is considered by its designer to indicate that it is possible to design a machine of any desired size and power, with perfect confidence that it will come fully up to the calculated performance. No limit is to be seen, as yet, to the size and power of the machines, if properly designed. Their construction is a matter of definite calculation, and is to-day independent of direct experiment. The fact that a dynamo may be precisely designed and proportioned for any kind and amount of work that may be demanded, for any purpose whatever, without limit, so far as can be to-day perceived, is one of the most interesting and important revelations of recent work in this field. The fact, also plainly shown by the experience of the Cowles Company, in the use of these enormous machines, that the larger the machine, the higher the duty of the plant, is no less interesting and important. The economy secured in the production of their aluminum and other alloys, by the increased size of the later dynamos put in operation, is so great as to be a very valuable factor in the operation of the business, each new and larger machine very considerably reducing the price at which the metals can be put on the market.

A tabulated statement presents the figures obtained at the trial of the ten-ton dynamo above described, and will repay careful study, as they exhibit the effect of variation of speed, of variation of current in the field-shunt, and of electromotive force, in the production of energy in the external circuit. The highest power attained on this occasion was, as shown in line 11 of the table, 249,000 watts, the speed of revolution being 405 (25 turns below the regular speed) the electromotive force being 83 volts (3 above the standard) and the current measuring 3,200 amperes. The electromotive force in the shunt coils was 80 volts. The heaviest current measured 3,400 amperes, the electromotive force being 68 in the main current and 52 in the shunt, the current energy measuring 231,000 watts at the terminals. At the standard speed of rotation, the circuit being broken, the measured electromotive force was 100 volts.

This remarkable and powerful machine was driven, at the time of the visit of the writer to the works, by a Corliss engine through a heavy countershaft, the engine belt being carried over the belt from the jack-shaft pulley to the machine. This arrangement is an unusual, but perfectly practicable one, and, in this case, worked admirably. It was occasionally necessary to readjust the position of the dynamo, as the belt, which was new and stiff and smooth, stretched more on one side than on the other; but this stretching will soon cease, probably has ceased, and, as the belt becomes more flexible and more perfectly fitted to its pulleys, and as it takes its maximum stretch, it is evident that it will work with perfect accuracy and will be competent to transmit any load that the dynamo can be expected to throw upon it.

The current from the machine to the furnace was conveyed by ropes of fine copper wire, or by conductors made up of several heavy wires. At the furnace, they were connected to the terminals, which latter were of bar copper, apparently about two and one-fourth inches in diameter, armed with four carbons each, the latter of about the same diameter and four feet long. Between these was arranged the conducting material which furnished the incandescent bed in which the operation of reduction was carried on. This process is not, as is very often assumed, by professionals as well as non-professionals, an application of the volaic arc to the production of high temperatures. Such an application was made by Sir William Siemens and by other experimenters from the time of the discovery of the intense heat of the arc; but it is, in the Cowles process, an application of the incandescence, as distinguished from the arc system. A connection is established between the carbon terminals, by means of a mass of carbon and other material, which mass is carefully kept continuous and incandescent throughout the whole operation. This is essential both to the success, actual and economical, of the process, and as distinguishing it from the older and wasteful systems of melting. By this system, the intense, the immeasurable heat of the arc is tempered and diffused throughout a large volume of incandescent material, and becomes adjustable and capable of regulation with comparative ease and exactness. Such control is thus secured as to make it convenient and economical in application to the reduction of ores and the melting of alloys and metals. Actual contract carries, everywhere, probably a very large proportion of the current, and the heat is distributed among numberless little particles of highly heated carbon, which lend each its share to the numberless particles of the compounds to be reduced.

It is probably only by some such application of the electric heat that corundum can be made to surrender its aluminum to form an alloy with copper. It has been stated recently, in the discussion of this process, as described by Dr. Mehner, before the Association for the Advancement of Science in the kingdom of Prussia, at the Berlin meeting of the present year, that this reduction had been accomplished in a furnace heated in the ordinary manner; but it would seem that this must be a mistake; since alumina is one of the most refractory substances known in nature; it is said to be even more so than the materials of our furnaces and of our crucibles. The Messrs. Cowles have subjected it to the highest temperatures, as they inform the writer, that a Dixon crucible would bear, without being able to reduce it or to melt it, in the presence of carbon and copper. Further, it would be probably impossible to successfully maintain a reducing flame, if that were attempted, or to avoid the reoxidization of the metal were its reduction primarily possible. The reducing temperature of the compound is above the temperature of volatilization, also, of the pure metal, and this would make it improbable that its reduction in this way should be successfully performed, far less with commercial success. The volatilized metal would rapidly escape from the Siemens furnace or from any other familiar form of furnace, while no other process than that above described would be capable of forming the volatilized metal in a closed furnace. In the Cowles furnace it is practicable to reduce alumina either with or without the presence of copper or other alloying metal, and one of the first intimations of the production of the working temperatures in that furnace is the appearance of fumes, indicating some volatilization to be produced. As ordinarily conducted, this is not important in amount. Alloys of aluminum have been made in this furnace with nearly all familiar metals, a proof that copper, at least, is not essential to secure the reduction. So far as the writer has been informed, this is the only process by which reduction of this metal with carbon alone can be accomplished. The production of the metal commercially, in this manner, is expected to soon become an accomplished fact. The manufacture of the aluminum alloys has now for some time been successfully carried on, the cost of the aluminum in the alloy having been reduced to a small fraction of the price for which the metal is sold as made by the older methods. The Messrs. Cowles and Professor Mabery have opened a new and broad field of experiment, and no one can surmise, even, what may come of the infinite range of possibilities so presented.

Electricity v. Gas.

Our English contemporary, the *Electrician*, says:

The owners of large private houses in the country are beginning to find out that electric lighting offers immense advantages over private gas works, such as was adopted when electric lighting by means of incandescent lamps was unknown. It will be remembered that Mr. O. E. Coope some two years or more ago gave his experience of fitting up the electric light, and compared with it the cost of erection of gas-holders, etc. The difference in cost was very small (being about £140 out of £1,400) in favor of gas. The great improvements introduced in dynamo machinery and the reduction in prices which has since been made, would, we believe, turn the scale largely in favor of the electric light. In any case, we believe that if owners of houses who are contemplating the erection of gas works for their own use will send to the leading firms connected with the electric lighting industry, they will get estimates for carrying out their work at as low a cost as it could be done by means of gas, with great additional comfort to themselves. In addition to this, the steam engine employed for driving the dynamo machinery could be utilized for many purposes during the day, such as pumping, etc. We should like to see some competitive tenders—1st, for supplying a complete installation for a house, say, requiring 300 lights, including engines, dynamo, fittings, etc., complete by electric light; 2d, gas-holder, furnaces, gas-pipes, fittings, etc. This data would, we feel sure, be very useful to many. Perhaps some of our readers will supply us with copies of estimates they have received for the supply of gas plant, also what estimates they have given in competition for electric lighting.

More Electric Lighting Rules.

It is stated that after careful consideration of the subject by the inspection department of the Boston Tariff Association, that body has prepared an entirely new set of rules, to apply to the running of incandescent circuits worked from arc circuits:

Only such wires as have been approved by this "Union" shall be used in constructing lines and circuits. Wires must be run in plain sight. In damp places they must have a water-proof covering. The positive wire or wires must be kept at least three inches from the negative wire or wires in running from the distributor or regulator, to the fixtures and lamps, and return, except that "twin wire" may be used for a single lamp. No wires should be run through partitions, floors or walls without being incased in a tube of hard rubber, porcelain, or if soft rubber is used, it must be covered with tape. The "safety fuses" must be so proportioned that they will melt long before the wire is heated to an unsafe degree.

Dust must not be allowed in the distributor-box or any of the electrical connections. The contact points should be kept clean, and care should be taken to ensure solid electrical connections at all the points of contact, and all parts must be kept free to move easily. In case any defect should arise in the distributor or regulator, or the wiring thereto, it must be arranged so as to automatically and absolutely shunt off from the arc circuit at once. In working distributors, the line of circuit current must be kept at its standard amount by tests made by ampere meter, from time to time. In no case must the amount exceed the standard. Every company shall have a competent and reliable person, to examine, daily, every distributor and regulator or similar device, which may in the future be applied to arc circuits.

The running of incandescent lights or systems on arc circuits should be avoided; but wherever this is unavoidable, a proper device or "distributor," such as may be approved by this "Union," must be provided, to prevent the possibility of an excessive arc current being thrown on to any one portion of the incandescent system; such device or "distributor" must have the approval of this "Union" before it is put in operation. It must remain open to inspection at all times, and no change made in any part of the installation after it has been approved, without consent of this "Union." Where incandescent lights are run on arc circuits, the following named practices are strictly prohibited: Fastening or attaching electroliers, or lamps, to any gas fixtures which may be in electrical connection with the earth. The running of concealed wires to the electroliers, or lamps, under any circumstances They must be entirely open to view. The placing of any distributor-box or regulator, electrolier, bracket, or lamp in such position that it may be connected in any way with any other wires, steam fittings, gas-pipes, gas fixtures, etc., which may be electrically connected with the earth. The placing of the distributor, electrolier, etc., in any damp location, or in any close proximity to any metal or other conductor of electricity. The building or placing of anything around the distributor or regulator so as to cut off easy access to it, or obstruct the access of air to it.

All joints, after leaving the distributor or regulator, must be soldered, using acid as flux. Resin will not be approved under any circumstances. All new devices should be submitted to the inspector of the "Union," and must be approved by him before permission can be given for their use. Permission is given for the use of the lights and wires of the —— company, located in or upon the within insured premises, when said lights and wires have been introduced in accordance with the rules of the "Boston Fire Underwriters' Union," and having been inspected and approved by the inspector of said "Union."

—— The Trenton Light and Power Company have now taken possession of the incandescent station, and will have the entire running of it in the future.

The Electric Light and Naval Warfare.

The manœuvers carried out during last week at Milford Haven afforded to the authorities an excellent opportunity of testing the value of electricity, and particularly electric lighting, in naval warfare. The main object of these imitation battles was to ascertain the best means of protecting mines against a sustained attempt to force them by a squadron, the value of torpedo boats to the defense, the best modes of manœuvering them, and the most suitable organization for the whole of the defensive operations. Electricity in one or other of the forms mentioned came into play very early, and throughout the operations exercised a most potent influence on the engagement. The electric light is peculiarly the enemy of the torpedo boat, and in this direction it rendered most valuable service again and again, but it has to be admitted that, partly perhaps through defective apparatus and partly because of a misunderstanding as to instructions, the light acted very erratically occasionally, and even played into the enemy's hands, on one side or the other. The course laid out for the attacking squadron was thickly laid with submarine mines, to be exploded either by contact or by electricity from the land. There was also a heavy boom barring the way, and besides these a defending flotilla of gun boats, torpedo boats, and guard boats. Their duty was to be on the *qui vive* to prevent the enemy approaching, and to guard against an advance in the darkness of night; powerful beams of electric light were provided at South Hook and Stack Forts, elevated points commanding the scene of the fight. The torpedo boats also carried electric lights. Thus there appeared to be small chance indeed of an antagonist getting close in; but the attacking ironclads also had electric lights to protect themselves against a covert attack, and the brilliant illumination at times is described as having been so general that neither side could hope for concealment. Both sides, therefore, would seem to have been on an equality in this respect, but it was discovered during the battle that opposing forces may add the light to their guns and other weapons. Electric beams may be met with beams, and the strongest beam will overcome and practically put out the weaker, just as one gun may silence another. This is a factor that will probably largely prevail in hostile encounters both on sea and on land. But the leading purpose of the light was of course to enable each side to detect the movements of the other; and a curious condition laid down for these operations was that neither guns "nor electric lights" were to be put out of action —a condition which certainly would not prevail in actual warfare.

Before the engagement began, and while defenders and opponents were vigilantly waiting upon each other, a curious instance of a disadvantage of the electric light occurred. Between one and two o'clock in the morning some objects that had been seen to move swiftly across the belt of light, were at once clearly shown up by the powerful Brush lamp on South Hook Fort, and it was only after the enemy had been enabled by this means to see distinctly what was going on, that the defenders found they had been illuminating their own boats. Meanwhile, the electric beams of the enemy, emulating those on shore, continually swept the water, so that no small craft, however swift, could elude detection, and no torpedo boat could get within striking distance of an ironclad. The first encounter having taken place, Sir William Hewitt, commanding the attacking squadron, chose the hour immediately following twilight on the Tuesday to renew his assault, and the defenders selected the same time for an attack on their part. In view of this counter attack, Sir William Hewitt turned on in their full strength the electric lights of his ironclads, and these spreading a bright searching light all round, quickly disclosed the defending boats and enabled the enemy to frustrate the counter movement. Then a pretty brisk engagement took place, favorable at first to the assailants, but in the end a flood of light skillfully worked from the shore, led to their discomfiture. Shortly after this, one of the enemy's boats, making for the mines, was brought into prominence by the light from Hook Fort and quickly driven back. On the manœuvers being again resumed in the dark, three of the attacking iron-clads were put into a position from which their electric lights could play directly upon South Hook Fort, and they managed to throw such blinding flashes into the eyes of the men working the guns in the Fort, that the latter had no chance of firing with any success. On the other hand, the same light in one instance failed to follow the enemy's boats, and Sir William Hewitt's movements became dangerous to the defenders, and in another instance the only result of the South Hook light being turned upon a solitary gun-boat detected, was to concentrate an attack upon her while the enemy were working out a more serious manœuver. Similar tactics were pursued later on by the enemy, who repeated the operation of flashing the lights in the eyes of the men in the batteries, and suddenly shutting off the light to conceal their own whereabouts, while they executed some wily design under cover of the dark, or of the smoke from the guns of their smaller craft. So the opposing forces seemed to gain alternate advantage from the use of this new aid to warfare, but on the whole, the balance of gain in this respect rested with the enemy, although in the end they failed to win a victory over the gallant defenders. In one case the light at South Hook Fort went out suddenly, and thereby the enemy were enabled to play havoc with the boom and some of the mines; while apparently not to be inferior, the Stack Fort light on another occasion refused to act for some hours. Perfect working was not, however, to be quite expected, and the whole experience cannot fail to be of value as a lesson in modern methods of fighting. In the firing of submarine mines, the electric wires seem to have acted admirably from the shore, when they had not already been broken by the enemy's boats.

The Electric Light at the Birmingham Art Gallery.

The Birmingham *Daily Post* says: "The new electric lighting of the Art Gallery at the Rotunda has now had upwards of a week's trial, and, with some slight modifications upon the original arrangement, is found to give the fullest satisfaction. The heat from the gas-lighting on a damp day, and when a public gallery is full of people, has a most injurious effect on pictures, and Mr. Whitworth Wallis has been refused the loan of some desirable pictures on this account alone. In addition, however, to the heat, the products of combustion, principally of an acid character, have an even more injurious influence, and, whatever devices the gas engineers have arrived at for confining and carrying these away, it is impossible to persuade the owners of valuable pictures that any system of gas lighting will make them safe. The incandescent lamps are arranged in a circular frame attached to the structure of the central gas pendant; but a new departure is in the introduction of silvered glass reflectors, constructed so as to throw the principal portion of the light upon the surrounding walls, while, at the same time, sufficiently illuminating the floor. An additional and important circumstance in connection with these reflectors is the economy effected, the pictures being better lighted by their employment than if double the number of lamps were employed. This means a saving on account of capital and cost of maintenance of about £500 original outlay and £100 per annum. The mirror arrangement is entirely new, and the results are such as were not expected by experts in the matter. There is no doubt that the principle will hereafter have a large field for its employment in the lighting of shops, club rooms, and large apartments generally. Mirrors of this kind can of course only be used with electric lamps, as gas smoke would at once dim the reflecting surface. The entire installation consists of a nine horse-power nominal Otto gas engine, of the latest type, and with special arrangements to secure steadiness, a result which is very perfectly attained. This drives a ten-unit Chamberlain & Hookham patent dynamo, specially designed for this installation. With its actual load it has an electrical efficiency of 95 per cent., the armature coils absorbing only 2 per cent. It is absolutely sparkless, and having an automatic brush arrangement, requires little attention. The leads are very heavy, absorbing only 2 per cent. of the current which they convey from the dynamo to the lamps."

Electric Lighting in Italy.

An Italian correspondent of *Industries* says:

"Many of the smaller towns of Italy are about to follow the example set them by Milan in the matter of electric lighting. The success of the Edison Company in Milan has been so great that the municipal authorities are encouraged to become themselves undertakers for the electric light, and are inviting tenders for the supply of apparatus and material. One example is furnished by the town of Udine, which is about to provide itself with 5,000 glow lamps for house and street lighting. The motive power in this case is obtained from three waterfalls, the most distant of these being situated three miles away from the town, and the nearest 1¾ miles At each of these three stations alternating current dynamos will be driven by turbines, but the exciting current for all these machines will be supplied by a continuous current dynamo placed at the last-named station. The alternating current delivered by these machines will be used to work transformers, placed at convenient points. The peculiar configuration of the town, and the unequal distribution of the lighting, requires the use of a rather large number of transformers. Each of these sub stations is surrounded by an Edison net-work, which distributes the secondary currents to the lamps. The total loss of energy allowed in the main lines between the machines and the transformers is estimated at 20 per cent. This high figure has been chosen in order to save copper in the conductor. The loss in the secondary mains will be limited to 4 per cent. of the potential at the terminals of the secondary coils of the transformers. It is expected that the installation at Rome will be ready for work before the end of September. The peculiarity of this installation is that it has been undertaken by the gas company of Rome. Here also alternating currents and transformers are employed. The electric light in Turin is not in so good a position. It has been divided between two systems, and up to the present not much progress has been made with either of the installations. One of these is an Edison plant, which has given much trouble during the last few months on account of the careless way in which the underground conductors have been laid down. The cables were at first placed in soft and yielding soil without any mechanical protection. After this, naked overhead wires were tried, but great difficulties were again experienced with the insulation. The other system is that of alternating currents, and curiously enough, this has again been divided. Gaulard & Gibbs are providing for the street lights, while the house and shop lighting is done by the Zipernowski-Deri Company. The small seaside town of San Remo will also be shortly supplied with electric light."

* * The Beattie Electro-motor possesses no special claim to novelty, except in the method by which it is made self regulating. The field-magnets, which are four in number, are each provided with several independent coils. The terminals of these coils are connected with a set of contact pieces, which are placed around the quadrant of a circle An ordinary centrifugal governor is geared to the armature shaft, and this actuates a lever having a circular rack at its extremity. The latter moves a double contact switch, one end of which slides over the contact pieces connected with the field-magnet coils, and the other slides over a similar set connected to some resistance coils. In this way any increase of speed cuts out one or more of the field-magnet coils, and introduces resistance instead. The system is open to several very obvious objections.

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We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

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The donation of $300, made individually by the delegates to the National Telephone Exchange Association, for the benefit of the earthquake sufferers at Charleston, S. C., was a very appropriate recognition of the claims of suffering brethren.

We are pleased to state that the troubles of Mr. Geo. M. Bartholomew, of Hartford, who was an officer of the Schuyler Electric Light Company, will not affect the actual business of that company in any way other than denying to it, to a certain extent, ready money for immediate necessities At at informal meeting of the principal creditors, recently held, we are informed that each one was so well pleased with the statement of past business and the present excess of assets over liabilities, that all creditors were recommended to grant the company any extension that might be deemed necessary. It seemed to be the desire of all to see that everything should be done to aid the company in prosecuting its business. That the Schuyler Company should be able to stand a loss of $200,000, and yet remain in position to continue its business as before, is particularly creditable to its immediate managers, and proves that it has secured a substantial and remunerative business.

The Society of Telegraph Engineers and Electricians have published in their transactions the paper on the "Relation of Electric Lighting to Insurance," read before the Baltimore meeting of the Electric Light Association by C. J. H. Woodbury, of Boston.

There is continual increase to the number of local electric lighting companies. The West is particularly active in this direction at the present time; and a large number of new companies in which the best citizens are interested are being formed. Every enterprising citizen likes to see his city well lighted.

The arguments in the telephone case before Judge Jackson at Cincinnati have all been submitted, and the judge will not render his decision for several weeks. The question argued was that of jurisdiction, the attorneys of the Bell Company holding that the Government could not bring suit against it outside of Massachusetts, the State in which it was organized, and where its business is managed.

The rapid growth of the electric light interests has called for trained mechanics in such numbers that the operation of many plants is necessarily entrusted to those who, while thoroughly conversant with their own particular trade, are not learned in electrical matters. These men are often placed far from large cities. The system of mutual insurance lately proposed would greatly benefit this class of men. To have the advice of a trained examiner of electric stations, to strive to have the station one of the best, would aid in improving the management of the plant of local companies, as much as in preventing fire. A more careful management of small details would convert an unfortunate company into a dividend paying one.

It seems that the Daft motor people were deceived, though no doubt unintentionally, by the Ninth Avenue Elevated Railroad people as to the amount of power required to draw a train on their structure, and this is given as the reason why the Daft motor, placed on the rails some time ago, has not proved a success The Daft people say their motor was constructed under the misapprehension that only from fifty-five to sixty horse-power was required by the service, whereas they discovered when too late that more than twice this power is needed to draw a train of four cars up the steep grade at Thirtieth street. For this reason, then, and no other, they removed, they say, their motor some time since, and have now about finished a much larger one, which, early in November, will be placed upon the rails of the Ninth Avenue Elevated Railroad.

It seems a pity thus to deprive the dwellers along Ninth Avenue of the nightly torch-light procession they have been in the habit of witnessing on the elevated tracks during the summer holidays, and we hasten to assure them that the deprivation is but temporary and that the pyrotechnical displays will soon be continued. In saying this we mean no reflection upon the efficient working of the Daft motor—what that is capable of doing in elevated service will soon be demonstrated under conditions which its projectors have themselves selected. The fire-works which have been an accompaniment of Daft motor trials on the elevated road only mean that an iron rail, which it is impossible to preserve free from rust, is being used as a conductor. Why the experimenters did not use phosphor-bronze instead of this, no one seems to know. It would have given a better service, and at the same time precluded the possibility of an unthinking public's becoming impressed with the absurd idea that a shower of sparks is a necessary evil in an electro-motor service. It seems only fair to this description of motor to say that it has done and is doing excellent work on the Baltimore and Hampdon Street Railway, in the suburbs of Baltimore, where there is one grade of nearly 300 feet to the mile on an 89-degree curve and several other heavy grades and sharp curves.

ADVANCE OF ELECTRICAL LIGHTING IN FRANCE.

The installation of electrical lighting in Paris grows apace, and it has been computed by eminent authorities that by the end of the year the Compagnie Parisienne du Gas will have lost 500,000 francs ($100,000) in a twelvemonth by reason of the growing popularity of this substitute for gas.

Another great theater is following the lead of the Grand Opera in adopting the electric light, and the proprietors of the big Casino at Bougival have just decided to accept the proposal of the electric light people, and substitute the arc and incandescent lights for all others in theaters and gardens. This is one of the most popular resorts in the neighborhood of Paris, and its example is likely to be followed before long by all the large gardens in the environs of the French capital. The incandescent lamps that will be used at Bougival will be of 12 candle-power; 40 volts and 0.9 ampere for the salons, cafe and theater; while in the gardens and grounds of the Casino there will be 18 foyers of arc lights, each of 90 candle-power—these last being fed by a dynamo with a circuit of 2,000 meters, the copper cable having a diameter of three millimeters.

At Lyons a company is now formed for the distribution of both the arc and incandescent light to those who are sufficiently educated up to the advantages of this description of lights.

That it is likely to do a good business in the near future is evident from the orders, which have already been sent in to the new company, which, by the way, is called Compagnie d'Electricité de Lyonnais. It is not likely that this company, or any other one in France, will find much occupation or profit in lighting up private apartments, as the French people, as a rule, use light as they use fuel, sparingly, one tallow candle sufficing where we in America use one gas jet and perhaps two. But the French people, like the Germans, are habitués of the garden and the café, and the number of these being legion are likely to furnish a rich field for the electric light companies.

CHICAGO ELECTRICAL NEWS.

The truth of the old adage, "there is nothing new under the sun," has a new exemplification in a manuscript which has just come to light in Chicago. The librarian, W. F. Poole, Esq., in charge of the Public Library, received a few days since a roll of manuscript, a copy of the diary of the Rev. Manasseh Cutler, A.M., LL. D., who was the originator and promotor of the scheme which gave to Ohio the Western Reserve, and who made the purchase of 1,500 000 acres of land, in 1788. His headquarters were at Marietta, Ohio, where he arrived in April, making the trip from Ipswich, Mass., 750 miles, in a sulky, in twenty-nine days.

Under date of Friday, Aug. 15, 1788, he says:

"This morn we went pretty early to boat. Gen. Tupper had mentioned to me a mode for constructing a machine to work in the head or stern of a boat instead of oars. It appeared to me highly probable it might succeed. I therefore proposed that we should make the experiment. Assisted by a number of the people we went to work and constructed a machine in form of a screw with short blades, and placed it in the stern of a boat which we turned with a crank—it succeeded to admiration, and I think it a very useful discovery."

Ninety-eight years ago, then, the first screw propeller was born on the banks of the Ohio river.

"A prophet is not without fame save in his own country," is as true in local as general cases. The *Tribune* the other day published a paragraph headed, "Magnetized Watches."

"A watchmaker says that the multitude of telegraph, telephone, and electric light wires in large cities has much to do with the variations and stopping of watches that hitherto have been good time keepers, and that manufacturers are trying to invent means to provide against this magnetizing of watches."

Within rifle shot distance of the *Tribune* in this city is the watch and jewelry establishment of Giles Brothers, one of whom is the inventor, patentee and manufacturer of a perfect and complete system of preventing "this magnetizing of watches;" or, better, of curing it.

The fact of the universal existence of magnetism in watches, clocks, etc., cannot be denied. Mild forms of this impregnation may be found in the iron and steel portions of these mechanisms, but in every article of either iron or steel, almost anywhere, from an iron cannon used as a snubbing post, or an iron column or lamp post, down to the finest cambric needle, or delicate hair spring in the original package. The earth's magnetism is to blame for this form of magnetism, and this will destroy the correctness of a time piece. The stronger magnetism from a dynamo will stop an unprotected watch; but with a shield this power is innocent for harm.

On the 23d ult., a very peculiar meteorological phenomenon was witnessed at Chicago. About nine o'clock A. M., the wind, which had been blowing gently from the south, suddenly hauled, and commenced a gale from the northeast. In a moment the sky was overcast, and everything bore the appearance of an imminent thunderstorm or cloud-burst of the fiercest kind. The blackness was as complete as it was sudden, and "cyclone" was upon the lips of thousands who were certainly not to be blamed for surmising almost anything in the category of violent meteorology. The phenomenon only lasted for a space of perhaps ten minutes; when the sun came out, the wind veered back to the south, and commenced where it left off so suddenly to give us a steady gentle breeze, just as if nothing had happened.

In the schools the darkness caused minor panics, the children leaving their seats and crowding to the doors. A few of the more susceptible fainted; but before the scare had become general enough to produce serious trouble, the darkness was dissipated.

Those who lighted the gas in down-town offices, had hardly time to sit down before the sun was shining brightly, as before.

Milwaukee took her portion about two hours earlier. Shortly after seven o'clock the heaviest rain and hail storm of the season broke over the city. Hail stones as large as hickory nuts covered the ground. (For the benefit of New England readers it should be stated that Western hickory nuts are fully twice as large as the "white wannits" of the Eastern States. These hail stones are of the hen's egg variety.)

A frame house was struck by lightning, and the lady who was the only occupant at the time was knocked senseless. After reviving, she discovered that her left side was paralyzed.

Still earlier in the morning, Madison, Wis., was visited by the same or a similar storm. An account says of it that, "It was preceded by a loud rumbling noise." Hail stones five inches in circumference fell in great quantities. Corn and tobacco were badly injured where these were still unharvested.

Decatur, Peru, Wabash, and other towns in Indiana, lying south of the 41st parallel and east of the 86th meridian, were each the seat of similar disturbances. In the midst of the storm at Wabash, a ball of fire entered the residence of A. L. Rohbock, made the circuit of the bronze cornice of the room, fell to floor, and burst with a deafening report. Mrs. R. was thrown down and quite seriously injured, and the house was filled with smoke and flame. The cornice was ruined, but no other damage was done.

A quite similar occurrence was witnessed a year or two since in Chicago. The ball of fire completely cleaned off the picture moulding, and went out through the wall of the room.

Niles and Holland, Michigan, Urbana, Ohio, Midway, Kentucky, were sufferers. Galveston, Tex., reported severe storms of

unusual severity during the 22d and 23d, and Indianola reported a wind of 50 miles velocity, and the streets three feet under water on the latter day.

There is an old proverbial remark to the effect that too much familiarity breeds contempt, which is almost daily exemplified in the manner of pseudo electric light engineers. The way these fellows install a plant, and the turkey-cock airs they put on when their methods are questioned,

"Puts stern old Science to the blush,
And bids Philosophy 'go hunt the bush.'"

The electric light amateur is the most unreasonable creature on the face of the footstool. As an old phrenologist used to say, in a scale of one to seven, he is about eight, in brassy impudence. Chicago has seen many of these in the past few years, one of whom has made no less than five attempts at putting in a plant and failed in every instance, because of a fundamental ignorance of first principles.

This scientist is one of those who are capable of taking the entire current of a 60 light dynamo and living to tell the tale. They believe what they claim, too, but somehow or other the lights never go out when the experiment is tried—a fact which proves one of two things: Either the fellow takes the current and releases it before the lamps can wink, which is quicker than lightning, or he only gets that portion which Ohm's law gives to the greater resistance in a derived circuit.

What brings all this up at the present time is a case of blooming electrical idiocy just arrived from—the Lord only knows where.

The party referred to desired to make an exhibition in a public show in a neighboring town, and brought along his own dynamo. He is one of the devotees at the shrine of the "temporary" fiend, and never completes an installation. He temporarily insulates his wires by fastening them up with a string, temporarily runs his lamps without globes, temporarily uses gas pipe for part of the circuit, because temporarily he has not quite wire enough to finish the circuit, and temporarily is not making half the showing that he will be if you call round in a few days when his new system will be on exhibition.

It may be here remarked in parenthesis, that temporarily the plant referred to is not running, and will remain in its present temporary state of quiescence until it is put in proper condition for inspection.

And yet, when one of the regular electric light fraternity questioned the propriety of inclosing the dynamo to prevent those who came to see his circus from possible contact with it, or the necessity of separating and covering two naked joints where these were close to and within easy grasp of even a child—one on either wire—he could see no reason for anxiety in either case. His light worked better without a globe, and although the miserable refuse carbons he was using were scattering sparks like a Chinese wheel, he knew "that kind o' sparks never done no harm."

At the next meeting of the Electric Light Association, a move should be made for the appointment of an electrical lunacy commission, through which all these fellows could be provided for and taken care of.

They might be furnished with a quantity of cat's fur and vulcanite plates, and permitted to snap sparks on each other's noses, or perhaps the worst cases might be corraled and made to run a telegraph college. Any development of electrical force beyond these primary forms is as dangerous in their hands as matches and gunpowder in the hands of little girls.

ERRATA—A most provoking error occurred in the printed copies of a paper read before the Fire Underwriters, at Chicago, on the 8th of September. In the fourth paragraph Mr. Haskins is made to say: "A copper wire one-seventh of an inch in diameter has a carrying capacity about equal to an iron wire approximating one inch in diameter." It should read, "seven times the sectional area of the copper." And another provoke appeared in the REVIEW of the 25th under Chicago Electrical News, where Mr. Madison, of Wisconsin, is reported as accepting the superintendency vacated by Mr. Hibbard.

CHICAGO, Sept. 27, 1886.

BOSTON ELECTRICAL NEWS.

In one respect Boston has a reputation none of the sister cities of the republic can claim. Every new form of religion or irreligion, devices for amusing the patient and making him think he is well find supporters without number. The charge has often been made, and still is made by many of the gaseous fraternity, that electric enterprises have not been on a business basis, implying by their tone and manner in discussing the question that investments in gas interests are on a solid basis. The former assertion is disproved by the steady and healthy growth of electric light interests, and of the latter—well, we will mention one case. It was some years ago that the discovery was made that by placing zinc or iron in sulphuric acid a gas (hydrogen) was given off that burned with a flame giving no light. A company was formed some time ago, taking as a basis the philosopher's lamp, and adding a certain amount of carbonic acid gas, when the combination of the two is passed through the carburetter and a gasolene light is obtained—nothing more, nothing less.

Although calling itself a water gas company, water is used in the manufacture simply to dilute the acid used to make a seal. Apparatus is not sold, but is rented. There is, however, no person or corporation which will put them in houses, but the one who applies is allowed to form a local company. The carbonic acid gas is made by the action of the acid upon clam-shells or carbonate of lime. Now, if the apparatus would furnish the carbonic acid gas in ice-water for use as plain soda, or if the hydrogen could be used in a balloon to furnish escape in case of an earthquake, or the oxygen for use by the weak-lunged, or by those of unsteady gait at 2 A. M. in the morning, we might pardon the want of novelty and common-sense in the apparatus. Efforts are made by the gas companies at great expense to remove the very carbonic dioxide gas, which is purposely added to the gas of the company of which we are speaking. It will be next in order for some one to invent a process for making gas from coal, or for making food more palatable and digestible by heating to boiling. A recent treatment for hay fever has been packing the patient in ice. This is suggested for any afflicted in the manner above described.

Taft, Wheeden & Co., Weybossett Mills, Providence, R. I., who have been using a Ball 30 light dynamo, have ordered a second machine and 26 lamps of the the Ball Electric Light Company of New England.

As an example of the attempt of leading manufacturers to meet the wants of the electric light and power people, the new 200 horse-power automatic engine of the Armington & Sims Engine Company might be mentioned. The cylinder is 18½ by 20, and at 180 revolutions per minute the piston speed is 600 feet per minute. The governor and eccentrics are on the outside of one of the fly-wheels in a convenient position for inspection. The fly-wheels also are brought nearer together, and less twist and wear is caused on the bearings when power is taken from one fly-wheel.

In an interview with one of Boston's leading business men, who has recently returned from Detroit, it was learned that he was much pleased with the financial success of the Windsor (Toronto) Electric Railroad. The power costs but $2 per day. The equipment cost $9,000 for 1½ miles of road; the receipts are $500 per month; so that, after paying all expenses, a profit of 75 per cent. is realized.

BOSTON, Sept. 28.

Mr. Geo. H. Roe, general manager of the Brush Electric Light Company, of San Francisco, is spending a few weeks in the East, visiting the large electrical manufactories, and inspecting all branches of electrical progress. His company, which was one of the first to enter the business, has entire control of the lighting in San Francisco, the station being a model one.

REFORM IN THE PATENT OFFICE—QUERIES OF THE LEGAL COMMITTEE OF THE NATIONAL ELECTRIC LIGHT ASSOCIATION.

At the meeting of the National Electric Light Association, held in Detroit in September, 1886, the subject of reform in the United States Patent System was seriously discussed, and the Legal Committee directed to examine the question carefully during the coming winter, and report to the next meeting a plan by which some of the evils that now exist may be rectified.

The duty imposed upon the Committee is a heavy one, and at the same time freighted with great responsibility; and they naturally look to the members of the association, and to the inventors and patent lawyers of the country for assistance.

The improvement of the patent system is a subject that is of the most vital importance to everyone who owns patent property, and it is therefore with strong hope of their co-operation that this committee appeals to them for aid.

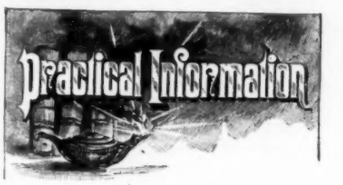
The first question that presents itself, is: What demands improvement? In answer to this it is only necessary to say, both branches of the Government system—the system under which patents are granted, and the system under which they are litigated. The committee feel that in this country there are a large number of persons who have had much greater experience than they in treating these questions, and they are satisfied that as all are working to a common end, the results they have in view would be greatly advanced if they could receive the views and opinions of those who have given these questions careful attention, and they would be deeply gratified if all those who are interested in patents and the administration of the patent system would consider the following questions carefully and write their views upon them.

1. What change would facilitate the examination of applications for patents?
2. What change would produce uniformity of practice in the Patent Office?
3. What change would enable an inventor to procure a patent which would be commensurate with his invention, rather than with the skill of his solicitors?
4. How can greater liberty and intelligence in the examination of patents by the courts be insured?
5. Under the rulings of the Supreme and Circuit Courts of the United States a patent is confined in its scope strictly to the letter of the claim, and it sometimes happens when a patent has been badly drawn that the patentee loses the benefit of his invention in consequence of this limitation. Is the present rule right or wrong, and if wrong what remedy would rectify the evil?

In answering these inquiries correspondents are requested to address Arthur Steuart, Baltimore, Md., General Counsel of National Electric Light Association.

The telephone people appear to have pretty much whipped the three dollar law into insignificance. The Wallace Company which obtained a franchise for operating an exchange at Indianapolis found they could do nothing without being enjoined by the Bell people on the basis of the New Orleans decision, and the company has allowed their concession to expire by limitation. Meanwhile the Central Union Company has full possession of the field, with about seven hundred and fifty—nearly three-quarters of the number before the law took effect—operating on the toll system inaugurated as a compromise until some satisfactory arrangement could be arrived at. The law has been declared constitutional, but the people who use and pay for telephones, seem to look on it as unnecessary, and it has virtually become inoperative—a dead letter.

The people found that the law-makers had made a grand mistake, and it will not be astonishing if the obnoxious statute is repealed or modified so as at least to make it reasonable, at the next session of the Indiana Legislature.



A new composition for waterproofing paper consists of the following ingredients combined in the proportions stated, viz., resin, 50 per cent.; paraffin, 45 per cent.; silicate of soda, 5 per cent. These ingredients are thoroughly mingled by beating them together, and by agitation. The paper to which the composition is applied is usually building or sheathing paper. The latter is taken in the condition in which it comes from the paper machine, being quite dry. A strip or strips of the paper from a roll or other convenient holder are conducted and drawn through the tank of hot composition, whereby the paper becomes well saturated with it, and upon emerging from the tank the paper passes between suitable rolls, which press any surplus composition from it, leaving it hard and smooth.

To make gelatine mould use a little bichromate of potash with the gelatine.

INDELIBLE INK.—Gelatine, 2 grs; bichromate of potassium, 2 grs.; nigrosine, 10 grs.; water, 1 fl oz. Dissolve the gelatine and the nigrosine in most of the water, and the bichromate of potassium in the remainder. Mix the two solutions in an amber-colored bottle. If it is found that the ink "gums" on the pen, the quantity of gelatine and bichromate may be somewhat reduced.

A metal-faced fabric or material for interior decorations is made by precipitating upon a previously prepared glass plate a thin sheet of metal, then applying a thin coating of glue, gelatine or other sticky substance on the metal or on the material to which the transfer is to be made, in such a way that the thin film of metal can readily be stripped off upon the article or fabric to be coated.

An exchange says that fitting a key constitutes a good test of a working machinist's ability. Set fifty men to fitting fifty keys or splines to the same keyway. When they are all done, you will not find three keys that will fit alike. A key must fit the hole completely, or it is useless. If it bears a ridge here or a lump there, or is full of small places, it is of no use. Make a sliding fit on sides of key and driving fit on top and bottom for most purposes.

Corks may be rendered perfectly ethertight by coating them with a solution prepared from four parts of gelatine, fifty-two parts of boiling water and one part of ammonium bichromate (added to the filtered gelatine solution), and then exposing them for a few days to the sunlight. An apparatus may be put together with unprepared sound corks, and the exposed portion of the latter afterwards coated and exposed to sunlight.

Vulcanized fiber is pure cellulose freed from all elements which are soluble in ordinary solvents, and from all volatile matters which are capable of ignition. It is absolutely uninflammable, and is not attacked by oils, benzine, fatty acids, alcohol, etc. Vulcanized fiber is made out of finely ground wood pulp, which is subjected in a closed vessel to a pressure of from 350 to 500 atmospheres, the lower pressure being employed in the manufacture of flexible, and the higher pressure in that of hard fiber.

A very good impression of any article of metal having a flat, ornamental surface may be taken by wetting some note paper with the tongue and smoking it over a gas flame. The article is then pressed upon the smoked part, when, if the operation be carefully conducted, a clear impression will appear. This can be made permanent by drawing the paper through milk and afterwards drying it.

Telephonic News

*** San Francisco is to have the multiple switchboard system. The Western Electric Company has contracted to put in a complete system for 1,800 subscribers, with a capacity of 4,000.

*** The city of Omaha, Nebraska, is to have all the latest improvements in telephone service, the Nebraska Telephone Company having contracted for the multiple switchboards of the Western Electric Company. The exchange will be completed for 1,200 subscribers, with a capacity of 4,000.

*** The telephone line between Norfolk, Va., and Smithfield has been completed, and telephonic communication has been established. The line has five cables, and on the poles is heavy No. 10 wire, instead of No. 13, as is generally used. Over the line a conversation can be heard very distinctly.

*** Last week the placing of underground telephone cables in Dorsett underground conduit tubes was begun in Detroit. A manhole was dug in front of the Newberry and McMillan block, and a cable containing 125 wires was placed in the tube from the manhole at the corner of Fort and Griswold streets, extending each way on Griswold street. Mr. Phillips, manager of the telephone exchange, said that the cables would be laid as far as the centers of all the business blocks in the alleys adjoining, and from there extend all over the buildings. He said that the underground telephone system is still an experiment, but if it should prove a success all their wires would gradually disappear from the surface.

*** The Bell Telephone Company, of Philadelphia, has taken the initial steps toward burying its wires, by submitting to the Board of Highway Supervisors plans for laying underground conduits on streets running east and west from the Delaware to the Schuylkill Rivers, between Vine and South streets, and on Market to Fortieth street, in West Philadelphia. These conduits will connect with branch cables on every other main street running north and south, and enable the company to reach every building in the district. The main conduits will consist of cedar logs, six inches square, with holes three inches in diameter, through which the cables will be drawn. The manholes will be wooden boxes, covered with a lid, and paved over. Mr. Henry Bentley, the president of the company, was present and explained the plans to the Board. The subject will be brought before City Councils on Thursday next. Mr. Bentley said it would probably require three to four years to put the wires under ground and the cost would be about $2,000,000.

*** It will be a long time before telephoning becomes cheap. Bell's first patent, the one upon which all the others are founded, is dated March 7, 1876. Patents are seventeen years in duration, and this first patent will thus run out in 1893. But there are other patents of more recent date upon parts essential to the operation of the instruments. For instance, the Blake transmitter was not patented until 1881, and it is so broad that it may be said to cover almost any transmitter which might be constructed. This will practically secure the monopoly until 1898. Then there have been many other patents of date up to a very recent time, which, while not absolutely essential to telephoning, would defeat competition, even if every patent on essential parts were out of the way. Thus the Bell Company controls patents upon switchboards and other apparatus used in making connections which would put competition by those who have not the right to use them at a great disadvantage. The nineteenth century will see no change from the present conditions, and it is impossible to foresee what other improvements will be patented wh'ch will in the future be considered necessities.—*St. Louis Republican.*

The Bell Telephone Suit.

THE PRELIMINARY SKIRMISH BEGUN IN CINCINNATI.

The hearing of preliminary questions in the suit of the Government to annul the Bell telephone patent was begun last week in the United States Court before Circuit Judge Jackson and District Judges Sage, of Cincinnati, and Welker, of Cleveland. Ex-Senator Thurman, of Columbus; Grosvenor P. Lowery, of New York; ex-Solicitor Goode, of Norfolk, Va.; and Jeff Chandler and Charles S. Whitman, of Washington, appeared for the Government, and J. J. Storrow, of Boston; ex-Senator McDonald, of Indianapolis; Aaron F. Perry, of Cincinnati, and R. A. Harrison, of Columbus, for the Bell Telephone Company. The defendant company has entered a special appearance. The papers thus far filed are the complainant's bill, a motion by the defendant to quash the service of the Marshal, a plea in abatement, and a motion by the complainant to strike from the files defendant's motion to quash the service. It was upon complainant's motion that the hearing was begun.

The court room was filled with attorneys belonging to the local bar, who were attracted by the celebrity of the opposing counsel, and by persons interested in the telephone company. The service of the Marshal was upon agents and partners of the defendant company, found in different cities of Ohio. The argument was opened by Judge Thurman. The motion of defendants to quash the Marshal's service was based upon two grounds, viz.: That the return of the Marshal was untrue, and that it was insufficient in law. Judge Thurman maintained that the return was sufficient in law, that its verity could not be attacked by motion, and that the motion was overruled by the plea in abatement. In developing these propositions Judge Thurman argued that the defendant company must take issue, which necessitated their either demurring or pleading. To allow the question of jurisdiction to come on for decision on a motion would work great injustice. If such a motion were sustained the whole case, so far as the Bell Telephone Company was concerned, would be at an end. The only testimony which could be introduced would be affidavits taken in Boston without notice to counsel for the Government and without the right of cross examination. To attempt by ex parte affidavits to overthrow the jurisdiction of the court was the boldest thing he had ever known in all his long practice. It involved a decision upon such a showing of the right of the Government to bring such a suit, of the merits of the complaint as set forth in the bill, and of the question of the legality of the service. Judge Thurman cited English and American authorities to show that the question of the truth of a Marshal's return can only be raised in an action against the officer making it.

R. A. Harrison responded for the company. He argued that the court could not be called on to dispose of their motion by acting upon a counter-motion, and that the return of a Marshal need not be accepted as absolutely true when the return relates to a matter of which he has no knowledge whatever.

The court interrupted Mr. Harrison with an intimation that the motion to quash the Marshal's return and the plea in abatement seemed to rest upon the same grounds, and it was unnecessary that argument upon both should be heard.

Mr. Harrison attempted to proceed with his argument, but was soon stopped again by the court, when an order was made that the motion of the complainant to strike out defendants' motion is overruled, except that part which raises the question of the legal sufficiency of the return, defendants being allowed to stand on their plea in raising the question of the verity of the return.

The afternoon session was occupied by an argument by J. J. Storrow. He maintained that the jurisdiction of the court was one thing and its power to bring into court a party residing in another jurisdiction was quite another thing; that this court cannot bring the defendant a thousand miles to answer to matters arising in another forum, but the complainant must go where the defendant is, and must have, not constructive, but actual physical service upon him. This position was supported by numerous decisions in various State and Federal courts. It was stated by Mr. Storrow that the Bell Telephone Company does not own a single foot of wire in Ohio, has no office or agent here, has no employes here, pays none of the employes in the telephone service in this State, and would not have the power to discharge a single one of them. The same situation, it was stated, exists in all the States. The Bell Telephone Company has sold its franchise in the various cities and towns, and has no connection with any of the telephone companies using the Bell instruments, except as to the matter of their franchise.

The Telephone Companies in Indiana.

THE WALLACE COMPANY'S LIMIT EXPIRED AND NOTHING ACCOMPLISHED.

The late telephone troubles seem to have utterly passed from public attention. But the present quiet will probably be succeeded by developments. The Wallace Company, which promised to do many things, and instanter, it appears now has no rights under its charter, except by suffrage. Its franchises were granted May 25, upon the condition that work on a telephone exchange should be under way within thirty days. Afterward that limit was extended sixty days, and the ninety days expired August 25. Thus far the company has apparently done nothing except to solicit subscriptions to stock, and to erect an experimental wire. Meantime the Central Union has full possession of the field; is operating 750 stations within the city, and awaiting developments. A large number of applications for new wires and stations are before the company, but these cannot be granted until the city extends the privilege. The present toll system has proven moderately satisfactory. The cost to patrons has, on an average, not amounted to $5 per month (the old rental). It will be interesting to note legislative action on the telephone question. Never was law more futile, except to embroil all concerned, than is the present statute regulating (?) the use of telephones. The companies in operation have done about as they themselves planned, and, although the law has been declared constitutional, yet it is a dead letter.

Another Claimant to the Discovery of Electrical Transmission of Speech.

In 1845, a wise and modest young man, reared in peaceful studies, became a soldier of the army of Africa; but being devoted to science, and gifted with one of those privileged intellects which permitted him to reach its highest regions, he did not despair. "I have no longer my professor," said he, "but I have yet my books; these shall be my friends, my guides, my consolers."

In 1849, at length, the young Charles Bourseul, son of an army officer, and himself a soldier in the 43d Line, gave his comrades of the garrison of Algiers a course of mathematics which attracted the attention and friendly interest of the Governor-General of Algiers. No one had recommended the simple soldier to the General; he had recommended himself, and the General, recognizing his merit, had generously held out a protecting and friendly hand. There is in that simple fact a touching eulogy of the soldier and the General.

To-day, freed from military service, Mr. Charles Bourseul dwells in Paris, and it is he who is the author of the curious article which you are about to read. We wish him all the success that he himself expects, and we shall be happy to see him attach his name to the marvelous discovery of the transmission of speech by electricity. Electricity has performed so many miracles—why not that (in despite of the academy, where it is treated as a folly, or, when one wishes to be polite, as Utopian) which has not yet been attempted?—a view which is encouraging, it is necessary to avow, for the inventors, for those sublime initiators without whom the academy would be but a collection of fossils. Let us say it once more, to sustain the ardor of genius in the reach for the unknown, there is nothing to expect, unless an insolent sneer, from these votaries of science. Fulton, and enough of others, learned so to their cost; but if you speak to-day to an academician of steam and the telegraph, he will tell you the thing was very simple, and that if the academy had wished to take the trouble, the discovery would have been made very much sooner. Ah, well, most wise doctors, here is a problem! Read the note of Mr. Charles Bourseul.

PAULIN.

It is known that the principle on which telegraphy is founded is the following:

An electric current passing over a wire comes to a piece of soft iron which it converts into a magnet. Whenever the current is absent the magnet has ceased to exist.

That magnet, which takes the name of electro-magnet, can, then, attract and set free in turn a movable plate, which by its coming and going produces the signals employed in telegraphy.

Sometimes one uses that movement directly, and makes it produce points and dashes on a band which is unrolled by a clock movement. The customary signals are then formed by combinations of these dashes and points. Such is American telegraphy, which bears the name of Morse, its inventor.

One also converts that coming and going movement into a rotary movement. Thus are derived the dial telegraph of the railroads and the State telegraph, which latter, by means of two wires and two needle indicators, reproduces all the signals of aerial telegraphy as heretofore used.

Let us imagine now, placed on a horizontal movable circle, the letters, figures, punctuation marks, etc. One can see that the principle explained will serve to enable him to choose at a distance such and such a character, to determine its movement, and consequently to print it on a page placed for the purpose. Such is the printing telegraph.

A farther step has been made. By means of the same principle and by a mechanism sufficiently complex, we have attained a result which, at first glance, seems a prodigy; writing itself is reproduced at a distance; and not only writing, but a stroke, a curve, in such manner that being in Paris you are able to design a profile by ordinary means, and the same profile is designed at the same time at Frankfort.

The efforts made in these directions have succeeded; the apparatus has figured in the London Expositions. There is, however, something lacking to perfect the details.

It will seem impossible to go farther in the direction of the marvelous. Let us try, however, to take some further steps. I have asked myself, for example, if speech itself cannot be transmitted by electricity; in a word, if one can speak at Vienna and make himself heard at Paris.

The thing is practicable—and this is how it can be done:

Sounds, everyone knows, are formed by vibrations, and carried to the ear by the same vibrations reproduced by the medium which intervenes.

But the intensity of these vibrations diminishes very rapidly with distance in such a way that there are, even to speaking trumpets, horns and acoustic cornets, very narrow limits which cannot be passed. I imagine that one is speaking near a movable plate, so flexible that it will not miss any of the vibrations produced by the voice; that this plate establishes, or interrupts successively, communication with an electric pile. You will be able to have at a distance another plate, which will make at the same time exactly the same vibrations.

It is true that the intensity of the sounds will be variable at the point of departure where the plate vibrates from the voice, and constant at the point of arrival, where it vibrates from the electricity, but it is shown that it cannot alter the sound.

It is evident, also, that the sounds will be reproduced at the same height of the gamut.

The present state of acoustic science does not permit one to say, *a priori*, whether the articulate syllables of the human voice can be reproduced. The manner of producing these syllables has not been sufficiently studied. It has been remarked, it is true, that some are pronounced from the teeth, others from the lips, but that is all.

However that may be, it is necessary to suppose that the syllables are exactly reproduced (to the ear) by nothing but the vibrations of the intervening medium. Reproduce, then, those vibrations, and you will also reproduce exactly the syllables.

In any case, it is impossible to demonstrate in the present state of science the impossibility of transmitting sound by electricity. All the probabilities, on the contrary, point the other way.

When it was first proposed to transmit dispatches by electricity, a man in the high ranks of science treated the idea as extravagantly Utopian, and yet we communicate directly between London and Vienna by a single wire. That is not possible, they say, and it is done!

It goes without saying that applications without number, and of the highest importance, will arise immediately from this principle of transmitting speech by electricity.

Not to be deaf and dumb—whoever is that can use this means of transmission, which will need no apparatus, an electric plate, two vibrating plates and a wire will suffice.

In a multitude of cases—in vast industrial establishments, for example—one will be able by this means to transmit at a distance such an order or piece of information, whereas one will not do so by electricity so long as an apparatus such as is used in telegraphy and special training would be required to accomplish the object better by letter.

However it may be, it is certain that in a future, more or less far off, speech will be transmitted for long distances by electricity. I have begun experiments; they are delicate and require time and patience, but as far as I have gone the results promise a favorable issue. CHARLES BOURSEUL.

Paris, August 18, 1854.

The New Roberts-Brevoort Batteries.

The Roberts-Brevoort Company have recently added to their list of excellent batteries a new peroxide battery, which we illustrate herewith. Fig. 1 is an exterior view of it. This battery is very durable, and, it is claimed, will stand as great draught as any open circuit battery.

It can be used in any of the standard battery jars, and costs less to form complete cells than for any wholly new battery It is ready for use the moment set up, and the compound for recharging costs very little.

Fig. 2. of the dry battery shows battery complete and ready for work. To protect these cells, it has a paper shell that leaves only the top exposed Fig. 3 is a sectional view of the cell through electrical connections.

A is the carbon cylinder.
B, chemical paste compound.
C, zinc element.
D, insulation between zinc and carbon.
E, asphalt sealing for battery.
F, metallic alloy, connecting binding post and carbon cylinder.

This battery consists of a carbon cell, with a compound in it which is in the condition of a paste, and which encloses the zinc. The cover is formed of asphalt, through which the zinc projects.

The battery, as constructed, is ready for immediate use without any addition; it can be placed in any position, without the slightest danger or liability to injure anyone or anything. There are no fumes, no climbing salts and no corrosion. All that is necessary to put the battery at work is to connect the wires to the binding posts. It contains its full charge of electricity when it leaves the factory.

It is specially adapted for use on yachts, steam vessels, railroad cars, or any place where a fluid battery would be undesirable.

The Local Manager of the Western Union at St. Louis Gone to Canada

Saturday night, September 4th, Mr. E. H. Brown, local manager of the Western Union Telegraph Company, left the city without notifying either the telegraph officials or his family. On Monday following he telegraphed Superintendent L. C. Baker, from Windsor, Canada, saying he was ill and asking for a vacation. The peculiar manner of his departure caused Superintendent Baker to order an examination of his books. While no positive information is furnished by telegraph people, it is intimated by Col. Baker that there is a shortage in Mr. Brown's accounts, but no statements are made as to amounts. By reason of the manner in which the business is conducted the shortage, if any exists, must of necessity be small.

Brown had been in the Western Union's service fully twenty-five years, and has been highly esteemed in a business and social way. His habits were, so far as known, exemplary. He has a wife and several children and owned a neat little home in this city.

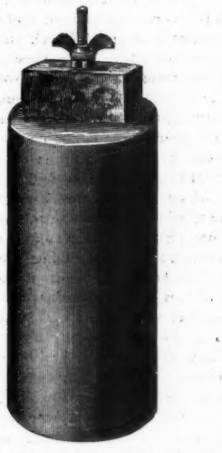
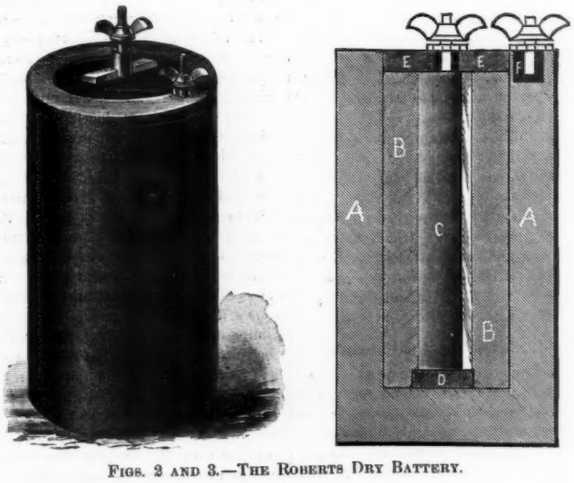


FIG. 1.—THE ROBERTS PEROXIDE BATTERY.



FIGS. 2 AND 3.—THE ROBERTS DRY BATTERY.

Proposed Industrial Electrical Association in England.

A circular has been issued, signed by eight or nine leading electrical companies and firms, proposing the formation of an "Industrial Electrical Association for the Advancement of Electrical Engineering." The objects which this movement aims at will be gathered from the following extract: "The duties of the association will be as follows: 1. To facilitate united action with regard to proceedings affecting the trade in Parliament and other public bodies. 2. To hold periodical meetings to discuss prices. 3. To collect and distribute information relating to the trade, its requirements, difficulties and dangers. 4. To examine and report upon inventions and processes affecting the trade, and the supply and quality of the materials used. 5. To deal with labor questions. 6 If desired, and when requested by the parties, to arbitrate on and adjust trade disputes by competent and recognized authority. 7. To grant certificates of competence in the art to individuals." We shall be pleased to receive any expression of opinion from those of our readers who are interested in this matter.

A New Telegraph Line Across the Continent.

It is now an assured fact that we have at last a second transcontinental telegraph line competing for the business of the Pacific coast, and arrangements for the construction of a third line have been definitely completed.

The telegraphic dispatches from New York state that the Postal Telegraph Company, of which John W. Mackay is the head and the principal owner of its stock, was completely reorganized recently by foreclosure and sale, the old stock wiped out and a new company formed with a capital stock of $50,000,000.

John W. Mackay is at present in Virginia City attending to his interests there, while his manager, Mr. Patton, is taking a vacation at Monterey. A gentleman who holds quite a confidential position with Mr. Mackay told a reporter recently that the new line would be pushed ahead at once. It is the intention to commence work at Portland, Shasta, San Francisco, and two other points yet to be determined within ten days. The line runs from San Francisco to Seattle, and from there connects with the Canadian Pacific Telegraph Company. A branch line has been constructed from Winnipeg to Minneapolis. At the eastern end a wire will be run from Richford, just below the Canadian line in Vermont, to Montreal. Another connection will be made at Morristown, N. Y., from which a wire has already been run across the St. Lawrence river to Brockville, Canada, where it will join the Canadian Pacific. Another branch line will run from Salt Lake City to Medicine Hat Station, on the Canadian Pacific in British Columbia, and from there to Seattle and San Francisco. This line will pass over 4,000 miles of territory, exclusive of the distance traversed by the Canadian Pacific lines.

The other line will run from Sacramento to Salt Lake and directly east, and its completion will place two transcontinental lines under the control of the Postal Telegraph Company.

.... Last week articles of incorporation of "The Riverside Street Railway Company of Fort Wayne" were filed with the Secretary of State at Indianapolis. The new company has undertaken a project which will be both productive of an income and interesting generally. The object in brief is to operate surface street car lines from the city to certain suburbs, the motor to be electricity, the company relying not more for its revenue on the immediate receipts from the passenger traffic than from the increased value of the land that will be brought into market for residence purposes.

TELEGRAPHIC

.... The number of telegrams sent annually over the English telegraph lines has increased from 9,000,000 in 1870 to 34,000,000 in 1885—a pretty good showing for government control.

.... The Louisiana Wire and Iron Manufacturing Company has been incorporated at New Orleans, La., with a capital stock of $25,000, with the privilege of increasing the amount to $100,000. The company has absorbed by purchase the factory known as the Louisiana Wire Works, No. 58 North Derbigny street. Mr. John Brasch will be the manager.

.... During one of the late thunder gusts the lightning struck a telegraph pole, in the line along the Vincennes Railway, a half mile this side of Eagle Creek, and shivered the upper end into match sticks, then ran along the wire and split another, and ended by peeling off a two-inch layer of a third pole for about fifteen feet of its length from the top down, leaving a singular exhibition of protruding knots. The hard turpentine-soaked knots would not come out, and the wood peeled from the pole was pulled off them, leaving a dozen of them sticking out an inch or two like the ends of bolts or big dark pegs.

.... Articles of incorporation have been filed with the County Recorder for the Los Angeles Electric Railway Company. The term for which the corporation is to exist is fifty years; and the five directors are as follows: Chas. H. Howland, Edward Bouton, Milton Santee, S. Wilson Church and Thos. E. Beatty, all residents of Los Angeles. The amount of the capital stock is $300,000, and the number of shares 15,000. The amount of capital stock actually subscribed is $500, the above-named directors having subscribed five shares each. The given purpose of the corporation is to construct, maintain and operate street railways in the city of Los Angeles, Cal.

. . . A telegraph operator in Milwaukee was one day trying to call up an office in a small town in the interior of the State, where the instrument was presided over by a woman.

He was about giving up in despair when the operator in another small town a few miles distant from the first ticked out the query:

"What in heaven's name do you want?"

"I want Miss Brown at Burgville," replied the Milwaukee man. "I have been trying to get her for the last half hour."

"That is nothing," came the reply. "There is a young fellow clerking in a dry goods store there who has been trying to get her for the last three years and he has not succeeded yet. Do not get discouraged."

.... The National Electric Service Company, of 686 Broadway, New York, have fairly opened business during the past summer. They have introduced their electric valve heat-regulating apparatus into the following residences and business houses:

Chicago	N. S. Jones,	Residence.
"	J. J. Glessner,	"
"	Ed. E. Ayer,	"
"	Otto A. Mitchell,	"
"	J. F. Halbach,	"
"	J. W. Garvey,	"
Omaha	H. E. Korty,	"
Philadelphia	The Borie Residence, Spruce Street.	
"	Temple Theater.	
New York	E. M. Cameron, M D.	
"	M. J. Allen, Residence.	
"	Commercial Hall Bank.	
"	American Water Works and Guarantee, of Muncie, Ind.	
Norwich	Dr. Wm. H. Mason.	
Bridgeport	Atlantic Hotel.	

ELECTRICAL AND SCIENTIFIC

* * One thousand new Williams telephone bells have been ordered of the Western Electric Company by the Nebraska Telephone Company.

* * If you want a carriage or implement photographed, so as to make a working copy to scale, all that is necessary is, when the photo is being taken, that a clear and distinct three-foot rule be placed on the carriage; this is photographed along with the carriage, and, no matter what the size of the print or negative, will always be a true scale. It enlarges and diminishes in exactly the same proportion as the carriage.

* * F. A. Blades, E. T. Hance, William C. Maybury, J. Huff Jones, W. E. Robinson, Alva T. Hill and John T. Liggett are the incorporators of the Detroit Motor Company, which filed articles of incorporation with the county clerk a few days ago. The capital stock of the concern is $100,000, of which $65,000 is already paid in. The business of the corporation is manufacturing, buying and selling electric motors, goods and appliances. The company has its motors already in use in some places in the city, and the sewing machines in Mabley & Co.'s large clothing work-rooms are now operated by its motors, driven by an incandescent electric current.

* * Lard and grease have, as is well known, a corrosive action on brass and copper, and this is a drawback to their use as lubricants for these materials. It has been pointed out that, while both melted india-rubber and vaseline are without corrosive action on brass, each alone has a disadvantage. Thus melted india-rubber is too glutinous and in course of time hardens. Vaseline never hardens, but it is deficient in tenacity and adhesiveness. A mixture of both substances is therefore recommended, consisting of 1 part by weight of melted india-rubber and 2 parts of vaseline. The rubber should be pure, not vulcanized, and cut into shreds, then melted at the lowest possible temperature in an iron cup while being pressed down against the hot cup and stirred into a uniform glutinous mass. The vaseline of a common thick brown sort should be added to the india-rubber and the whole thoroughly stirred and blended together.

* * Professor Brun has published in the *Archives de Geneve* an interesting study on the so-called lightning holes to be found in the high Alps. He and other investigators have found them at heights from 3,348 to 4,000 meters, or between 11,000 and 13,000 feet above the sea level. Usually they are found on summits. Sometimes the rocky mass, which has been vitrified in the passage of the electric fluid, presents the appearance of small scattered pearls, sometimes of a series of semi-spherical cavities only a few millimeters in diameter. Sometimes there are vitrified rays going out from a central point to a distance of four or five inches. Sometimes a block detached from the mass appears as if bored through by a cannon ball, the hollowed passage being quite vitrified. The thickness of this vitrified coating or stratum never exceeds a millimeter, and is sometimes not more than the quarter of that depth. The varying colors which it presents depend on the qualities and composition of the rock. The same may be said as to its transparency. On the Rungfischorn the glass thus formed by the lightning is black, owing to the quantity of actinolith which the rock contains. It is brown on La Ruinette, the rock consisting of feldspar mixed with gneiss containing chloride of iron. Under the microscope these lightning holes display many interior cavities, which must be attributed to the presence of water in the rock at the moment of melting by the electric discharge. This vitrified material has no influence on polarized light.

A New Electric Motor Company Formed in Baltimore.

A certificate of incorporation was filed last Friday, of the Baxter Electrical Manufacturing and Motor Company, of Baltimore City, with Benson M. Greene, James D. Mason, Jr., James F. Morrison, William Baxter, Jr., Wm. V. Logan, Leopold Strouse and Samuel Rosenthal, incorporators. Capital stock, $200,000. The corporation is formed for the manufacture of implements and machinery for electric power, electric lighting, etc. The new company takes in the Morrison Electrical Works, Mr. J. F. Morrison accepting the presidency of the motor company, and plans are being made for extensive additions to the plant, which will give employment to between 400 and 500 men. Mr. T. McCoubray, former secretary of the Morrison Electrical Works, will be general business manager of the new company; Wm. Baxter Jr., the electrician.

Orders for the Baxter Motor are coming in very rapidly, 1,100 now being in course of construction.

Lighting by Primary Batteries in Europe.

During the past nine months a temporary primary battery installation has been in full work at the Guildhall School of Music. The installation consisted of 80 50 volt 10-C.P. incandescent lamps and 1 Brockie-Pell 2,000-C.P. arc lamp. The necessary current for the 50 incandescent lamps and the Brockie-Pell arc lamp in the practice room was supplied by 80 cells, arranged 40 in series and 2 parallel. For the class rooms, 40 primary cells charged 26 E.P.S. accumulators. The accumulators were used to regulate the current for this section on account of the great variation in the number of lamps required at one time, thereby considerably increasing the cost of maintenance. The school and class hours ranged from 9 A. M. to 10 P. M., and in several rooms the light was constantly used, and during the foggy days the whole of the rooms were lighted during those hours. The Brockie-Pell arc lamp was in use 8 hours during each week. The following statements give all necessary details:

Greatest number of lamps running at one time	80
Number of Holmes-Burke cells	120
E.P.S. accumulators	28
Brockie-Pell arc lamp, 2,000 C.P.	1
Total number of lamp hours (incandescent)	43,200
Total number of hours run of arc lamps (35 weeks)	288
Cost of chemicals, including mercury	£46
Cost of zincs, less sale of old or waste ditto	£70

The above figures have been compiled from the books of the company which fitted up the installation, and the batteries used were the well-known Holmes-Burke type, manufactured by Messrs. Johnson and Phillips, of London.

Searching After the Unattainable.

Every now and then we come across old and impossible schemes, which for a few years are allowed to remain buried in obscurity and are then suddenly and periodically awakened into new life and brought forward as revolutionary ideas. In our issue of the 11th inst., when commenting upon the prize offered by a recently launched contemporary for a new design for an electro-motor, we said: "But there exists, also, that large class of would-be-inventors who are an absolute nuisance to their employers through wasting time and materials on worthless schemes, and it is on account of these half-educated, and often obstinate men, that some firms suppress, by direct orders all effort in this direction."

A favorite notion with this class of individual is that of contriving, by ingenious but futile reasoning, to make copper conductors with a surface area as large as possible, ignoring altogether the fact that conductivity depends upon the sectional area or the weight of copper in the conductor.

A second absurdity, not quite so well known as the foregoing, is the belief which still exists in the minds of some men, that the electrical energy consumed in one electric lamp may be made, by suitable devices, to actuate any number of others.

A Mr. John Palmer sends to an engineering contemporary a device, and to quote his own words, "If this would answer it would practically revolutionize electric lighting." Precisely, but unfortunately for Mr. John Palmer, his idea—a well worn one, by the way—is utterly fallacious.

The apparatus he proposes to construct is the following:

"A disk consisting of hard wood or vulcanized fiber, around the edge of which are fixed a number of brass contact pieces, with binding screws, for connecting wires from incandescent lamps. In the center of the disk there revolves a metallic arm, carrying at the end of it a brass brush to make contact with the contact pieces fixed on the disk. The revolving arm is to make about 2,000 revolutions a minute, so that the current is switched on and off each lamp 2,000 times every minute. Under these circumstances the whole of the lamps would appear to be continuously incandescent, owing to the persistency of retention of the retina of the eye; and the current necessary to keep all the sixteen lamps alight would only be what is ordinarily required for one, say a current of five amperes and 100 volts. As the whole of this current would certainly pass through each lamp 2,000 times a minute—each time the revolving brush made contact with the contact piece in connection with that particular lamp—it would appear as if it was a continuous current going through the filament."

A pretty idea certainly, and wonderfully economical.

Some six or eight years ago a Mr. Harrison advocated a precisely similar system. In his case, the actual working apparatus consisted of a small Gramme machine and one or two of Harrison's arc lamps, but the commutator with the revolving arm formed part of the scheme, although we do not know that the apparatus was ever constructed. At all events visitors were assured that 100 lamps similar to those in operation would be actuated by the small dynamo, and with only the same expenditure of power as would be required for the illumination of one lamp. If we are not mistaken the same idea may be found in a patent granted to a gentleman some years ago, who was then, and is still, a shining light in the electrical world.

Doubtless Mr. Palmer did not take into consideration such little mishaps as the burning up of his commutator and dynamo; but he might have asked himself, can it be possible to work twenty lamps with no greater consumption of electrical energy than when only one lamp is burning? Had he done so he would probably have consigned his communication to the flames or the waste paper basket. But perhaps this remark is premature. Mr. Palmer, if we mistake not, is the same gentleman who has sent us a design for eliminating the counter-electromotive force of electro-motors; thus trying to do away with the very element which determines their efficiency.

Here, however, is a sad instance of a mind, ingenious enough in a way, entirely misdirected, apparently through the want of a thorough elementary instruction in electrical science. Mr. Palmer, however, does not stand alone; there are still many minds constantly engaged in searching after the unattainable.—*London Electrical Review.*

* * A 35-arc light plant of the Western Electric Company is being put in at Crestline, Ohio.

* * In France electricity has been very successfully applied to quieting restive and vicious horses while being shod. The arrangement comprises simply an induction coil, a dry battery, and a device for giving a shock of graduated intensity.

* * The photographs of the group of attendants at the last clam-bake of the American Electrical Works, of Providence, have been received at this office, and all who ordered a copy can receive it by calling. A number of extra photographs have been left here by the photographer, for sale at $1 each.

Digest of U. S. Patents on Storage Batteries.

REFERENCES TO FOREIGN PATENTS OBTAINED THEREON.

(TENTH PAPER.)

1884.

305,025. Sept. 9, 1884. Filed May 13, 1882.
W. A. Shaw, Brooklyn, N. Y.

Refers to the method of making pipes described in Patent No. 203,891.

305,737. Sept 30, 1884. Filed Feb 2, 1884.
W. E. Case, Auburn, N. Y.

Describes an electrolytic liquid, consisting of a neutral solution of sulphate of zinc and oxide of magnesium—a solution that will not form a caustic hydrate. The electrode used may be both of lead or of lead and zinc.

CLAIMS.

In a secondary or storage cell, an electrolytic liquid containing in combination a solvent or suspending fluid and two substances, one of which may be decomposed to yield a free acid; the other substance being capable of uniting with said acid to neutralize said acid without the formation of a caustic hydrate during electrolysis, substantially as described.

In a secondary or storage cell, and in combination with a metal negative electrode and an electrode of less oxidizable metal or material contained therein, an electrolytic liquid containing a neutral salt, which salt, on the charging of the cell, is decomposed into an acid and a non-caustic hydroxide, substantially as described.

306,051. Oct 7, 884 Filed Jan. 5, 1884.
French Pat. No. 158,883 Nov 30, 1883
Nicholas Basset, France.

The electrodes are composed of carbon covered with neutral peroxide of iron or granulated "colcothar" wrapped in blotting paper, the electrolyte used being a concentrated solution of the prolochloride of iron.

Describes also a battery vessel of wood or compressed paper coated with a layer of mastic, composed of wax, resin, paraffine and pulverized colcothar.

306,405. Oct. 14, 1884. Filed March 30, 1883.
W. Lochlan, London, England.

Describes a battery vessel made of brown glass in the form of an oblong rectangle packed in a box and protected by felt.

The electrodes are provided with tags extending upwards, and rest upon insulating strips.

307,461. Nov. 4, 1884. Filed April 12, 1884.
A. S. Hickley, Montreal, Canada.

The electrodes are arranged horizontally in the containing vessel; at the bottom of the cell is a sheet of galvanized iron wire netting connected to a wire which forms one pole of the cell. Over the netting is a body of mercury, and over that a grating of wood or vulcanite or of other non-conducting substance, and over the grating a quantity of broken carbon closely packed. The electrolyte employed is a solution of sodium chloride.

307,462. Nov. 4, 1884. Filed April 12, 1884.
A. S. Hickley and Warren S. Hill, Boston, Mass.

The essential features are the containing case, in which are a series of trays containing a body of mercury, a series of carbon rods, one of which forms one of the poles, and a mass of broken carbon surrounding all.

Electrolyte, a solution of sodium chloride.

307,463. Nov. 4, 1884. Filed Nov. 2, 1883.
Arthur S. Hickley, Montreal, Canada.

The electrodes are the negative, a body of mercury covering a coiled wire which is carried upwards to form a terminal; at about the middle of the jar a plate of carbon is supported, which forms the positive. The solution is the chloride of sodium or an alkaline metal.

307,945. Nov. 11, 1884. Filed June 10, 1884.
W. S. Hogg, U. S. Navy.

The electrodes are of lead and zinc amalgamated, and separated by a porous partition. The lead is immersed in a solution of sulphuric acid, and the zinc in a solution of sulphate of zinc.

The New Station in Lancaster.

Editors Electrical Review:

The thriving and busy city of Lancaster, Pa., may well be proud of possessing the banner Edison electric light plant of the day.

Mr. P. B. Shaw, who has long been intimately connected with the promotion of Edison electric light interests, contracted last spring to build for the Lancaster Company "the best electric light station of its kind in the world," and he has well fulfilled his promise in the broadest sense of the word.

The main building is two stories high, 87 feet long by 47 feet wide, with a handsome front of pressed brick. It contains at present 4 Armington & Sims engines of 146 H. P. each, and 8 Edison dynamos, each having a capacity of 500 ten candle power lamps, with all the very latest and most improved electrical apparatus.

Everything in connection with the electrical part of the work was placed by Mr. Shaw under the personal superintendence of Mr. W. S. Andrews, of New York, who, in the position of Chief Electrical Engineer to the Edison Company, that he has filled for many years, has had as wide and practical experience in this line of work as any man living.

The boiler house is 37 feet by 45 feet, and contains 4 boilers of 140 H. P. each, and the smoke stack, circular in shape, is 8½ feet diameter inside and 90 feet high. The entire structure is put up in a remarkably substantial manner, and is finely finished in every particular.

On Saturday evening, Sept. 18, at 6.30 there was an interesting scene in the main building. Miss Rosa Sener, the seven year old daughter of Mr. Frederick Sener, opened the throttle of one of the Armington & Sims engines, and when the dynamos had attained their normal speed, Miss Miriam Sener, daughter of W. Z. Sener, a young lady who has seen but ten summers, closed the main dynamo switches, and for the first time the immense overhead system of conductors, containing over 60,000 lbs. of copper, were charged with the current, and the lights were turned on for public use.

Thus at the hands of two little girls were the citizens of Lancaster first given "the light that has come to stay!"

From a business point of view the plant promises to be one of the most successful ever installed, the equipment being complete in every particular, the field for lighting remarkably good, and the public spirit of the inhabitants liberal and progressive. "Let the good work go on!" C.

Lancaster, Pa., Sept. 27.

Electric Lighting in Springfield, Mass.

Editors Electrical Review:

GENTLEMEN:—In the spring of '83 the Springfield Electric Light Company was incorporated, and the furnishing of arc lights begun, and the good service furnished has called for a steady increase of plant. Your representative was kindly shown over the station and the details explained by the superintendent, John J. Moore, under whose able management the company have attained a success which has made it the envy of less successful venturers in other cities.

The motive power in the dynamo room which is in the basement of the building, consists of one 75 horse-power (nominal) Buckeye automatic engine making 171 revolutions per minute. When, as lights are turned on, the load is equal to the capacity of the engine, a 250 horse-power, double Harris-Corliss engine is started and brought to speed, when by cut-off coupling the latter engine takes up the load, and the former is relieved. This is done regularly every evening without in any way affecting the steadiness of the lights upon the circuits. By the side of each dynamo there is a movable pulley stand. In starting a machine the movable pulley is screwed out until the belt can be easily slipped upon the dynamo pulley. The pulleys are covered with paper and a slipping belt is almost unknown. By the use of the cut-off or friction clutches on the engines and the fast and loose pulleys for the dynamos any portion of the plant may be stopped without affecting the rest. There are 5 Thomson-Houston machines in use, two 30 lighters, 10 amperes, three 45 lighters 6.8 amperes.

The field magnets of the machines are painted a light yellow. The slightest bit of oil or dirt is at once discovered and removed. The dynamo is much brighter and more cheerful than when a darker color is used. This fall the plant will be largely increased, to allow of the operation of a much larger number of incandescent lights than at present, and the distribution of power by electric motors. That the service is satisfactory beyond question is proved by the company's success in church lighting with arc lights. The introduction of mammoth incandescent lamps has, however, furnished a very reliable and desirable method of illuminating such places and at present the State street (Baptist), the Trinity (Methodist), and the First Congregational, are lighted with 125 candle-power incandescents in the interior, and arcs on the outside. It is found that 8 mammoth incandescents light a church in a manner that leaves nothing to be desired.

For some time the company has furnished lights on long contracts, and no rebates have been made on account of imperfect service. Such confidence does the community have in the reliability and certainty of their supply of lights that a large number of gas fixtures have been taken down.

There are in all throughout the city 185 arcs, of which 45 are used in street lighting, 63 incandescent lamps, of which all but 24 are 125 candle-power. The 24 include 18 on Sun distributor and 6 on Thomson-Rice distributor.

The switchboard in the station is so placed that it is completely in view from a point where every machine can be seen. This company, the oldest in New England, outside of Boston, have never had an armature or a lamp burn out; a fire has never been caused by the current from this station, and not a single man has ever been hurt.

The City Hall has recently been remodeled and is lighted with fourteen 125 candle-power incandescent Thomson-Houston lamps. These are arranged six on a side and one at each end, in such a way that an even distribution of light is obtained. It has been found that the strong tones of the fresco work come out perfectly—a feat which cannot be accomplished by gas. S.

Springfield, Sept. 5, 1886.

An Electric Sword.

An inventor at Shanghai, China, has contrived an electric sword, which, when the point touches the party attacked, sends a powerful shock through him, and if not immediately killing, will at least put him hors du combat. The sword is an ordinary military sabre; but along its whole length is let in a fine platinum wire, which ends at the point of the weapon. A small but very powerful storage battery is carried strapped about the waist, much the same as a cartridge box. Insulated wires connect this battery with the sword, and, by pressing the button, the holder can complete the circuit at pleasure.

—— The Jarvis Engineering Company, No. 61 Oliver street, Boston, has shipped this week a 90 horse-power Armington & Sims Company engine to the New Haven Electric Light Company, New Haven, Conn., to be used to furnish power for incandescent lights.

—— Electricity plays an important part on board the Naniwa Kan, a newly-constructed cruiser built on the Tyne for the Japanese Government. The two engine-rooms are illuminated with Swan incandescent electric lights, and the coal-bunks, stoke holes and captain's saloon are similarly lighted. On the bridge of the vessel there is a circular conning tower, from which the captain can himself steer the ship by electricity. At either end of the bridge are two electric search-lights of great power and brilliancy, and about midway between these are a steerage apparatus for the officer on watch and an engine-room telegraph. Forward and aft on each broadside are torpedo projecting stations. An electric battery is employed to fire the torpedo at the right moment.

A Portable Electric Lamp.

BY W. H. PREECE, F.R.S.

The demand for a new safety lamp in mines has directed many minds to the application of electricity to this purpose. Some have proposed to use primary batteries; others utilize secondary batteries or accumulators. One of the most portable, compact, and convenient forms is that of Mr. Pitkin. It occupies a cubical space of 59 cubic inches for two cells, and 86½ cubic inches for three cells, weighing 5 lbs. 8 oz. and 7 lbs. 3 oz. respectively. The three-cell battery gives a light equal to 2.5 candles immediately after removal from the charging source, and lasts for nine or ten hours. I have also used it for other purposes. It is a most convenient portable lamp for going into a wine cellar or visiting our greenhouses, and it makes a very convenient reading lamp for railway traveling. I carry such a battery in my dressing bag, and by means of a flexible cord carrying two copper conductors I suspend by a hook to my waistcoat front a small candle-power Edison-Swan lamp that concentrates upon my book or my paper all the light I want. The lamp is fixed in the focus of a reflector whose surface is enameled dead white, instead of being bright polished. The light is thus much more equable and uniformly distributed. It is, moreover, soft, absolutely steady, and free from smell or annoyance to my fellow passengers. It is lighted instantly without any match, and it can be rapidly replaced by a small coil of fine platinum wire, which, being raised to incandescence, enables me to light my cigarette.

—— It is now definitely settled that the United States Electric Lighting Company, of Chicago, will have the contract for lighting the new asylum at Toledo.

—— The Wichita Gas Company are so well satisfied with their electric lighting enterprise that they are increasing and adding another dynamo with a Westinghouse engine.

—— The Fifty-fifth Annual Fair of the American Institute was opened in this city September 29th. The space is well filled, and a number of fine electrical exhibits, which will be described at length in subsequent issues, have been made. There will be an unusual display of fine engines and labor-saving machinery of all kinds.

—— A car load of poles, the dynamo, the wire, globes and all material for the electric light plant of the Winfield (Kansas) Electric Light and Power Company has arrived. As soon as a meeting of the directors can be held, the company will receive the material and proceed at once to put in the plant. It will be but a short time before Winfield will be lighted by electricity.

—— One of the handsomest and most elaborate engine catalogues ever issued is the one recently published by the Southwark Foundry and Machine Company, of Philadelphia. The specialties of this great company, particularly the Porter-Allen and Southwark engines are described at length, and most beautifully illustrated. The enterprise of the company in sending out this catalogue, the expense of which must have been unusually large, will certainly be appreciated. In addition to the artistic work a number of valuable tables are included in the catalogue.

—— Messrs. Chas. A. Schieren & Co., the well-known manufacturers of electric leather belting, New York, have lately furnished belting for the following electric light plants: Bangor Electric Light and Power Company, Bangor, Me.; Nashua Electric Light and Power Company, Nashua, N. H.; Boston Rubber Shoe Company, Boston, Mass.; Boston Cordage Company, Boston, Mass.; Edison Electric Light Plant, Great Barrington, Mass.; Bates Manufacturing Company, Lewiston, Me.; Edison Isolated Company, Boston, Mass.; Beverly Electric Light Company, Beverly, Mass.; Lafayette Gas Company, Lafayette, Ind.; Edison Electric Illuminating Company, Cumberland, Md.

ELECTRIC LIGHT NEWS

—— An electric light plant of 50 arc lights is being put in at Steubenville, Ohio, by the Western Electric Company, of Chicago.

—— The Electric Light Company, of Niagara, has increased its capital stock to $50,000.

—— The Brush Electric Light Company will have a four-story building erected on Elizabeth street, New York, from plans of Mr. J. Ireland.

—— Gas jets burned $1,250,000 worth of property. Wanted, a device for preventing the contact of goods and curtains with open gas burners.

—— A borough of Willimantic, Conn., which has for some time been considering the adoption of electric lighting, has decided to use the Waterhouse system. The borough expects to put in a circuit of 45 lights at an early day.

—— The permanent offices of the Brush-Swan Electric Light Company, until the completion of their new building, will be at 36 Union Square (cor. Fourth avenue and Sixteenth street). The general officers of the company will be found at the above location after the first of this month.

—— The managers of the Cyclorama of the Battle of Gettysburg have just closed a contract with the Ball Electric Light Company, of Boston, to put in an entire plant for lighting their building. They will put in a Ball 25-light dynamo, ten ampere current, a Southwark engine, and a Hodge steel boiler. The same company is installing a plant in Stoughton, Mass.

—— At Aurora, Ill., the Common Council, at a special meeting last week, decided that it is more economical for the city to own and operate its own electric light plant, and voted to accept the bid of the Thomson-Houston company to put in a sixty-lamp plant at a cost of $15,000. This includes two dynamos of forty-five 2,000-candle lamp power each, seventy-five horse-power engine, and boiler to match, battery at the pumping station of water-works, twenty miles of wire, and everything complete and in running order.

—— At Paterson, N. J., orders for enough electric lights to take all the power and current that can be furnished by the new central station, have been received, and the prospects of further demands are so good that the company proposes to at once enlarge the works. The adjoining lot has been purchased, and plans and proposals are now being prepared for another building. The Watts-Campbell Company have been requested to give their price for another engine, of the same style as that now in use, and 250 horse-power. The capacity of the present plant is about 180 lamps. It is proposed to make the machinery able to supply 400. Mr. John F. Noonan is entitled to great credit for the efficient manner he has handled this new company.

—— The Harlem Electric Light Company has been organized under the State laws of New York and is actually at work putting in a lighting station. Mr. A. L. Soulard, the president of the company, is so well known to Harlemites that he needs no introduction, having been for some time the acting and energetic Chairman of the Board of School Trustees of the Twelfth Ward. He is also President of the German-American Real Estate and Guarantee Company, Mutual Life Building, and was for many years the President of the Sterling Fire Insurance Company of this city. Mr. John H. Hapgood, with whom the new company has made a contract, has had a large experience in the erection of electric light plants, having organized several Western companies.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING SEPT. 21, 1886.

349,222 Galvanic battery; Benoit Jarriant, Paris, France, assignor by mesne assignments to the Chemical Electric Light and Power Company, Portland, Me.

349,241 Apparatus for making sulphuric acid; Jean J. Thyss, Bakou, Caucasus, Russia.

349,312 Telephonic circuit; William Marshall, New York, N. Y.

349,380 Electric battery; Ernest Bazin, Paris, France.

349,392 Electric motor and generator; William Hansell, Nevada, Iowa.

349,422 Magnetic separator; Charles O. Bartlett, Cleveland, Ohio.

349,472 Underground conduit; Jas. C. Anderson, Highland Park, Ill.

349,493 Electro-mechanical synchronizer for clocks; James H. Gerry, Brooklyn, N. Y., assignor to Marshall E. Hunter, Oakland, Cal.

349,496 Wire cutter; Randolph Hayden, Haddam, Ct.

349,516 Electrolier; Charles G. Perkins, New York, N. Y., assignor to the Imperial Electric Light Company, same place.

349,533 Electric burner; Adolph T. Smith, New York, N. Y.

349,539 Telephone time register; Joseph H. Tabony, New Orleans, La., assignor of one-half to Atwood Violett, same place.

349,562 Electric motor; August Bossard, New York, N. Y.

349,572 Manufacture of incandescents; Robert Dick, Glasgow, Scotland.

349,575 Telephone receiver; Lorenzo S. Fairbanks, Boston, Mass.

349,579 Electric annunciator; John Geary, Philadelphia, Pa., assignor of one-half to J. Elliot Shaw, same place.

349,580 Electric annunciator; John Geary, Philadelphia, Pa.

349,600 Galvanic battery; Charles E. Piper, Moline, Ill.

349,605 Electric programme clock; Andrew J. Reams, Augusta, Kan.

349,611 Induction coil; William Stanley, Jr., Great Barrington, Mass., assignor to George Westinghouse, Jr., Pittsburgh, Pa.

349,612 Induction coil; William Stanley, Jr., Great Barrington, Mass., assignor to George Westinghouse, Jr., Pittsburgh, Pa.

349,613 Automatic cut-out for electric light circuits; William Stanley, Jr., Great Barrington, Mass., assignor to George Westinghouse, Jr., Pittsburgh, Pa.

Parties Intending to purchase Electric Lighting Machinery, should consult

W. N. GRAY, Electrical Engineer,
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Wanted, by a capable electrician, a position as superintendent or manager of an electric light station, arc or incandescent, or a combination of both; mention system. T. S. H., care of REVIEW, Box 3,329.

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A. C. FOWLER, C.E., was Examiner in the U. S. Patent Office from 1880 to 1886, in the Interference and Electrical Divisions.

Inventors and Others
HAVING
EUROPEAN PATENT RIGHTS
FOR ELECTRICAL INVENTIONS
FOR SALE,
Or which they desire TO PLACE, are requested to communicate, giving Full Particulars, with
GEORGE H. BENJAMIN,
Electrical Engineer and Expert in Patent Causes,
No. 35 WALL STREET, NEW YORK.

IN CHANCERY OF NEW JERSEY—RECEIVER'S SALE.

In the matter of the insolvency of The Consolidated Telephone Co.

Notice is hereby given, that by virtue of an order of the Court of Chancery of N. J., dated September 14, A. D. 1886, I shall sell at public auction, to the highest bidder, on Tuesday, the fifth day of October, A. D. 1886, at 2 o'clock P. M., at my office, No. 47 Montgomery street, Jersey City, N. J., the following described property of said insolvent incorporation: about 25 complete acoustic telephones, 45 acoustic telephone boxes with diaphragms, about 10 reels more or less of telephone wire, one dozen square telephone boxes, small weighing scales, foot lathe, sundry carpenter and other tools, sundry telephone appliances, office furniture, etc., and also the following numbered and described letters patent of the United States: No. 328,243, for a new and useful improvement in telephone exchanges; No. 207,436, for improvement in mechanical telephones; No. 266,056, for improvements in mechanical telephone exchange; No. 278,750, for angle-hanger for mechanical telephone lines; No. 298,243, for improvements in mechanical telephone exchange; also 10,985 shares of the capital stock of The New York and New England Telephone Co.

ROBERT L. LAWRENCE, Receiver

WM. B. GILLMORE, solicitor of receiver, No. 1 Montgomery street, Jersey City.

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The only Carbon made from Natural Gas Our works are thoroughly equipped with Modern Machinery, and we guarantee the longest life, greatest brilliancy without hissing.
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55 South Third Street,
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Fig.259

PHOENIX GLASS COMPANY,
(Works, Water Cure, Beaver County, Penn.)

Fig.255
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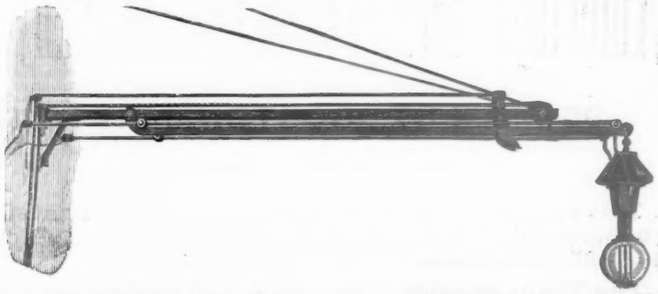

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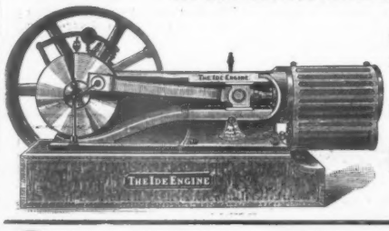

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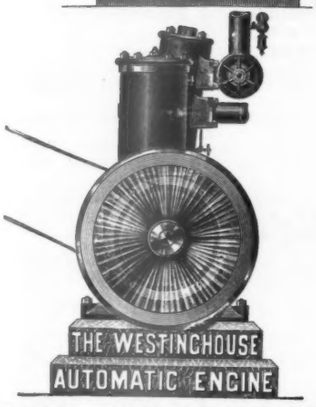

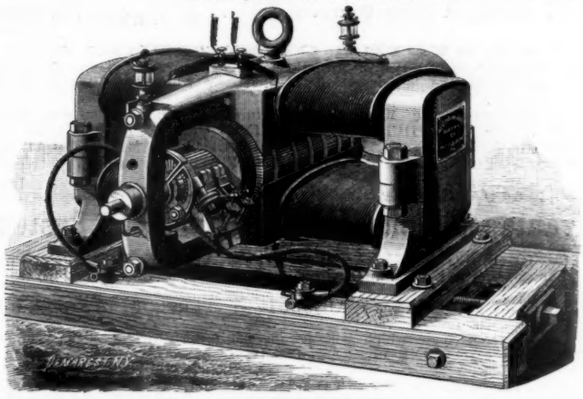

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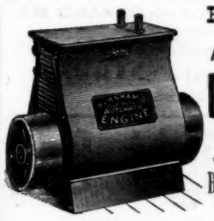

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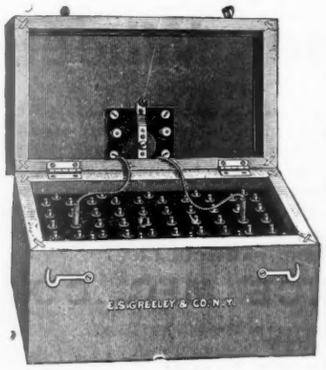

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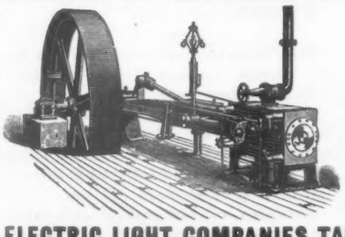

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These patents, as well as some 300 additional detail and system patents, are all owned by this company.

All forms of incandescent lamps as well as a great majority of the "Detail" and "System" devices offered by others than this company and its licensees, infringe the above mentioned patents, and all persons using them render themselves individually responsible for such unlawful use, and all the consequences thereof, and liable to suit therefor.

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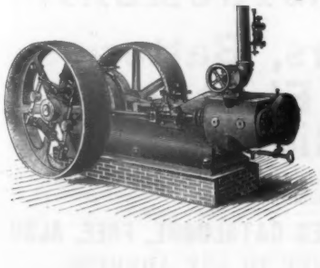

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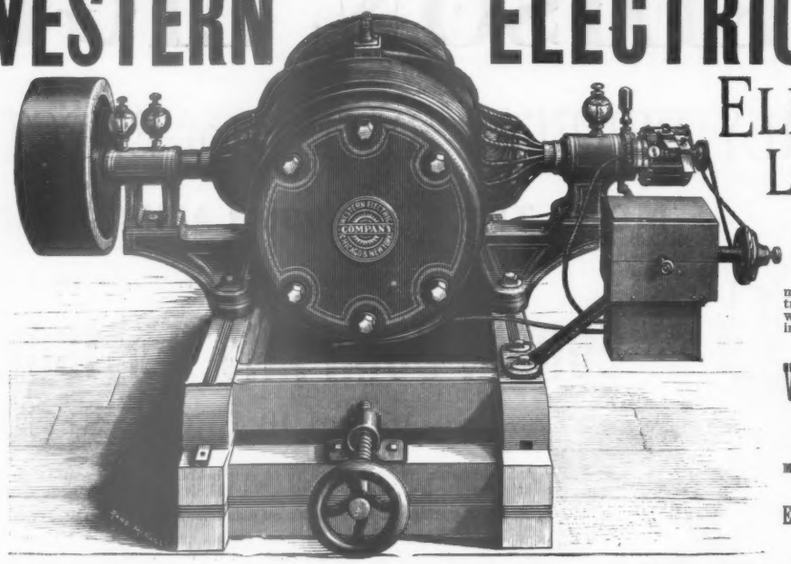

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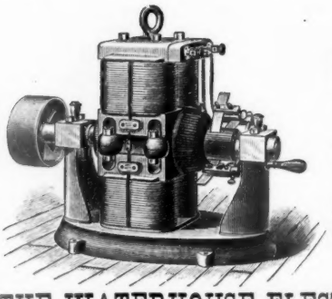

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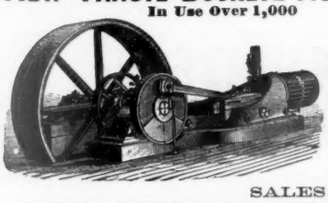

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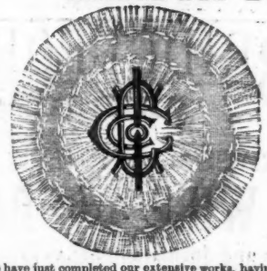

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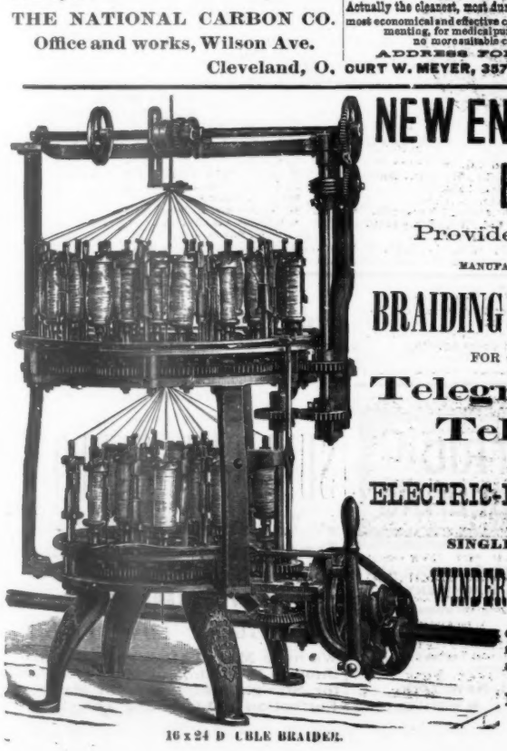

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